The MMPI:
A Review

By

Wm. C. Cottle

Kansas Studies in Education

UNIVERSITY OF KANSAS PUBLICATIONS
SCHOOL OF EDUCATION—LAWRENCE, KANSAS

Vol. 3 MARCH, 1953 No. 2

Copyright 1953 by
the University of Kansas Press
All Rights Reserved

PRINTED BY UNIVERSITY OF KANSAS PRESS, LAWRENCE, KANSAS

FOREWORD

The School of Education of the University of Kansas is happy to present this review of the research on the Minnesota Multiphasic Personality Inventory as a service to its graduates in the counseling and guidance sequence of the educational psychology program and as a general contribution to the field of counseling and guidance. As far as is known at this time, this review is the first published attempt to collect the many reports of research on the MMPI into a single source and present them in an organized fashion. It appears that such a presentation should make it possible for counseling psychologists and clinical psychologists to locate research on this instrument pertinent to their particular interests.

The research reviews which we present here as a part of the *Kansas Studies in Education* should be a valuable supplement to the MMPI manuals and to the *Atlas*. We hope it will help our own graduates in counseling and other counselors, not only in Kansas, but across the nation, to come to know and use more fully one of the better devices in the field of personality measurement. We hope it will promote a better understanding of our youth and ways in which we can help them.

Kenneth E. Anderson

THE UNIVERSITY OF KANSAS SCHOOL OF EDUCATION

DEAN, SCHOOL OF EDUCATION ..... Kenneth E. Anderson

EDITOR, *Kansas Studies in Education* ..... Oscar M. Haugh

ACKNOWLEDGEMENTS

Grateful acknowledgement is made to Dr. Harrison G. Gough and Dr. George S. Welsh for their suggestions, for copies of unpublished material and for permission to reproduce published material. Appreciation for permission to reproduce printed material is also expressed to Dr. Herman O. Schmidt; Leroy A. Wauck; Mary A. Morrow; Dr. Frederick C. Thorne, Editor of the *Journal of Clinical Psychology;* Dr. Fillmore H. Sanford, Executive Secretary of the American Psychological Association; and to the Ronald Press Company. A word of thanks is due the many colleagues who read and criticized the manuscript and to Dr. Oscar M. Haugh for his editorial work.

W.C.C.

Lawrence, Kansas
March, 1953

TABLE OF CONTENTS

Chapter		Page
1	Introduction	1
	Usage	1
	General Construction	3
	Rationale	3
2	The Validating Scales	6
	Cannot Say	6
	Lie Scale	6
	Validity Scale	7
	Correction Scale	7
	Summary	9
3	The Clinical Scales	10
	Studies Contributing to Validity of Original Nine Scales	10
	Research Producing New Scales	21
	Summary	23
4	Pattern Analysis	25
	Neurotic, Psychotic, Psychopathic Patterns	25
	Factor Analyses	29
	Comparing Profiles	31
	Summary	32
5	Adaptations	33
	Card Form	33
	Scoring Methods	33
	Booklet Form	34
	Shortened Form	34
	Braille Edition	35
	Coding Methods	35
6	Use in Clinical Psychology and Medicine	36
	General Use	36
	Experimental Use	38
	Therapy	41
	Use with Physiological Conditions	43
	Use Pertaining to Character Disorders	45
7	Use in High School, College, and Occupations	48
	Use in the High School	48
	Use in College	49
	Vocational Use	55

8 Use in the Armed Forces 58

9 Correlation with Other Tests 61

10 Interpretation 66

Bibliography, 1940-1950 74

1951 Bibliography 81

List of Tables

1 Brief Description of Scales of the MMPI 1
2 Reliability Coefficients Reported for MMPI Scales 5
3 Product Moment Correlations for 400 Adult Males between the MMPI and Strong, Kuder and Bell Inventories 65

List of Figures

1 Mean Profiles without K for Mild Psychoneurosis as Shown by Gough and Schmidt 26
2 Mean Profiles without K for Severe Psychoneurosis as Shown by Gough and Schmidt 27
3 Mean Profiles with K for Schizophrenics as Shown by Wauck 28
4 Mean Profiles without K for Psychotics as Shown by Gough and Schmidt 28
5 Mean Profiles without K for Character Disorders as Shown by Gough and Schmidt 29
6 Percent of Frequency That Each Scale Was One of the Three Highest Scales in Each Individual Profile of 34 Chronic Alcoholic Neurotics (CAN) and 33 Chronic Alcoholic Psychopathic Cases (CAP) 30
7 Profile of College Student with Marked Family Problem 69
8 Profile of College Student with Character Disorder 70
9 Typical Psychoneurotic and Psychosomatic Profiles as Shown by Gough 70
10 Typical Psychopathic Profile 71
11 Typical Psychotic Profile 72
12 Profile of College Student with Family Problem and Marked Introversion Tendencies 73

Chapter 1
INTRODUCTION

Usage

The Minnesota Multiphasic Personality Inventory (MMPI) has been used for the past decade for preliminary psychiatric screening in counseling centers and clinics, in military service, and to help clarify or confirm diagnoses of complex psychiatric disorders. Much research has been done in thesis form or published in the journals, but little effort has been made to compile this research into a unified study of the instrument. It is the purpose of the present work to collect and collate the research on the MMPI from publication of the first article about it in 1940 to 1950. A brief description of the various scales of the instrument is given in Table 1 for those who are unfamiliar with its purpose.

Table 1

Brief Description of Scales of the MMPI

	Variable	Test Authors' Description
MMPI		
1 ?	Cannot Say Category	Includes items which subject can answer neither true nor false
2 L	Lie Factor	Falsify scores by choosing most socially accepted response
3 F	Validity	Check on validity of test-rationale and pertinent responses, did subject understand items
4 K	Correction Factor	Acts as suppressor variable to increase discriminatory power of five clinical scales
5 Hs	Hypochondriasis	Amount of abnormal concern about bodily functions
6 D	Depression	Depth of clinically recognized symptom complex, depression
7 Hy	Hysteria	Conversion-type hysteria symptoms
8 Pd	Psychopathic Deviate	Absence of deep emotional response, inability to profit from experience, disregard of social mores
9 Mf	Masculinity-Femininity	Tendency toward masculine or feminine interests
10 Pa	Paranoia	Suspiciousness, over-sensitivity, delusions of persecution
11 Pt	Psychasthenia	Phobias or compulsive behavior
12 Sc	Schizophrenia	Bizarre and unusual thoughts or behavior
13 Ma	Hypomania	Marked over-productivity in thought and action
14 Si	Social Introversion	High score indicates social introversion

A number of reviews have considered the use of structured personality inventories in psychological science. A survey by Berkshire and others (18)*

*Figures in parentheses refer to the number of the study as listed in the bibliography, pages 74-81.

which included data from surveys made in 1945, 1946, and 1947 shows that the Bell Adjustment Inventory and the Minnesota Multiphasic Personality Inventory (MMPI) were the personality inventories having the most frequent use in counseling centers. Berkshire's survey showed that these inventories and the Bernreuter were the only personality inventories listed among the thirty tests used most frequently in 310 V. A. guidance centers and Jewish Vocational Service centers.

Ellis (71) made a study of the validity of personality inventories when correlated with various types of objective criteria. His study has been criticised for the exceptionally high standards set up as evidence of validities. In a series of generally negative findings about the validity of personality inventories 13 clinical validation studies of the MMPI are included, only eight of which indicated evidence of validity acceptable to Ellis's standards. However, only two of these thirteen studies show validities below those commonly accepted in psychology and education. Ellis concluded that "among the newer questionnaires, the Minnesota Multiphasic schedule appears to be the most promising one—perhaps because it gets away from group testing . . . .".

In another review of personality questionnaires a year later, Ellis (72) concluded that interest has shifted to consideration and use of a newer type of inventory such as the MMPI, Guilford-Martin, Cornell Index and the Humm-Wadsworth. He states "a great many validity studies of the Multiphasic Inventory have appeared during the last three years. About half of these studies gave evidence of positive validity; the other half indicated either lack of validity, or only weak validity."

A review of the effectiveness of personality questionnaires in military practice was done by Ellis and Conrad (73). They found that those inventories validated against a psychiatric criterion gave considerably higher validity than corresponding civilian studies. They advance as reasons for this the more favorable psychometric environment in military service, biased sampling and inadequacies of experimental design caused by military conditions. Seven of the studies reported by Ellis and Conrad concerned the MMPI. They are reported elsewhere in this paper. MMPI studies validated against performance measures (a pass-fail criterion) of military success showed little efficiency, probably because of homogeneous grouping and unreliable criteria. Ellis and Conrad suggest "in conclusion it appears that, while the experimental or statistical shortcomings of many of the military studies justify a cautious attitude toward the results obtained, the fact cannot be ignored that the inventories usually did make some definite contribution to psychiatric screening".

Burton (35) analyzed cases reported in *Case Histories in Clinical and Abnormal Psychology* by Burton and Harris to tabulate the frequency of use for certain personality measures in clinical psychology. He found that the MMPI ranked fifth in the number of administrations and was the most widely used structured personality inventory. However, its frequency of use was considerably below that of the Rorschach, Wechsler-Bellevue and Thematic Apperception Test. The MMPI was given most frequently to psychoneurotics and individuals with behavior problems. Burton's study was necessarily limited in scope and cannot be accorded the same weight as that of Berkshire (18), but it does show a trend in the use of the MMPI for a clinical situation. More than sixty

percent of the studies in the present paper deal with the use of the MMPI under clinical circumstances.

Super (195) devotes a number of pages in his book to a review of the MMPI. He concludes that the value of this inventory for counseling and for selection of employees remains to be demonstrated.

A brief review of research reports on the MMPI is included in a paper by Traxler and Jacobs (198) covering the period from August, 1946, to July, 1949. Since these are covered in greater detail in the present paper, they will not be recapitulated.

The reviews listed above have shown that the MMPI is a highly popular structured personality inventory. Its validity has been demonstrated in a clinical situation and for psychiatric screening in a military situation. There is some indication in these reviews that the MMPI may be useful also for counseling and for selection of employees, but this needs to be explored further.

General Construction

McKinley and Hathaway (148) began the construction of a multiphasic personality schedule in 1937. It was intended as a screen test for use by physicians to help identify abnormal psychological states, notably the psychoneuroses. The original form contained 504 items selected from psychiatric texts, psychiatric examination direction forms, directions for case history construction in neurology and medicine, and from earlier forms of structured personality inventories such as the Humm-Wadsworth Temperament Scale, the Bell Adjustment Inventory and the Bernreuter Personality Inventory (110). It was later expanded to the present form of 550 items presented on individual cards or combined in a test booklet. The individual taking the test answers these items as *true, false,* or *cannot say* (*?*), by sorting them into the three categories when taking the card form, or by marking answers on a IBM answer sheet when taking the booklet form. More detailed information about the manner in which the test is administered can be secured from the manuals (107, 112, 114, 115).

It is claimed that this is the first personality inventory constructed to measure specific clinical syndromes (180). The authors selected the items composing most of the scales on the basis of the ability of each item to differentiate between a normal group of individuals and a criterion group of clinically diagnosed abnormals who exhibited relatively pure psychiatric syndromes. The normal group included 724 individuals not under a physician's care. They were tested simply because they accompanied relatives or friends who came to Minnesota University hospital for treatment. There were also included in the normal group 265 individuals from the university testing bureau who were mainly pre-college high school graduates; 265 skilled workers on a local WPA project, and, 254 hospital cases of physical illness who were checked to eliminate obvious psychiatric conditions. The abnormal group includes a total of 221 psychopathic patients (110).

Rationale

There has been much discussion of the value of items used in structured personality inventories. Argument waxes back and forth over such topics as

the individual's ability to give himself a valid rating in comparison to his rating by others, his sincerity and honesty in answering test items, and the reliability of his score. Meehl (151) has pointed out that scoring does not assume a valid self-rating. He says that questions on personality inventories are not important as facts, but as indicators of how an individual *feels* about the items. That is, it is unimportant whether a subject does or does not have frequent colds when compared to others. The important question here is that such a person considers that he has frequent colds and therefore appears to be concerned about his health. It is the accumulative effect of a number of items of this nature which permits the identification of those individuals with an abnormal concern over their health.

The concern of psychologists over the honesty and sincerity of the individual taking the test is evidenced by the inclusion of the validating scales and the numerous studies of faking. While this may be a legitimate concern of the person responsible for occupational selection and placement, there is no evidence to show that subjects who voluntarily seek help with an emotional problem consciously falsify their scores. It has been the experience of the writer in university testing centers and in group research that such subjects try to be as honest as possible. This is evidenced by comparing scores on personality inventories with other case data.

In discussing the reliability of personality tests McKinley and Hathaway (149) suggest that fluctuations in behavior may be consistent with those found in certain clinically defined syndromes. Such fluctuations over a period of time may also reflect actual changes in behavior between the test situations. Only two studies of the MMPI have considered this temporal element in behavioral change and attempted to account for it in experimental design. Cottle conducted a study of the card versus booklet form of the MMPI where both forms were given within a week to 100 subjects (54). He secured coefficients of correlation between the card and booklet forms for the clinical scales which approach the size of those reported for the reliability of either form alone. Holzberg and Allessi computed reliability of the shortened MMPI for 30 psychiatric patients (119). These subjects were tested within one or two days on the full and on the abbreviated form. They report coefficients for the clinical scales ranging from .519 to .927. They state also that, although statistically significant differences were found between mean weighted scores for Hs, D and Pa, "these results were not clinically significant as judged by profile results". The manual for the MMPI reports reliability coefficients for scales developed in final form to range between .71 and .83 (115). Reliability coefficients for each clinical scale as reported in the literature are shown in Table 2.

Therefore we note that securing adequate reliability coefficients for a personality inventory may be hampered by fluctuations in personality between tests. That is, variation between testings is quite apt to be a function of personality changes and not necessarily a defect of the test.

The person who uses the MMPI should constantly bear in mind that it is only a diagnostic aid. It merely tells *what,* not *why.* For an understanding of the psychological forces which have produced the scores one must resort to the interview and to other investigations of life situations which creat these psy-

TABLE 2

Reliability Coefficients Reported for MMPI Scales

MMPI scale	Hathaway McKinley (1951)	Holzberg Allessi (119)	Cottle
N=	Varied	30	100
?		.745	
L		.846	.46
F		.927	.75
K			.76
Hs	.80(N=40)	.669	.81
D	.77(N=40)	.803	.66
Hy	.57(N=47) .47(N=98)	.874	.72
Pd	.71(N=47)	.519	.80
Mf	.70(N=34) Burton (27)	.756	.83[m] .79[f]
Pa		.783	.56
Pt	.74*(N=47) .91°(N=200)	.720	.90
Sc		.891	.86
Ma	.83	.585	.76

* Test-retest
° Split-half
[m]=68 males
[f]=32 females

chological forces producing abnormal behavior. It is the *what,* the description of the complex psychological state identified by the MMPI, and the experiments that have been made with it to which we turn next.

Chapter 2

THE VALIDATING SCALES

There are four validation scales included in the inventory: the *cannot say* (?) category, a lie scale (L), a validity scale (F), and a suppressor variable (K). L and F were originally presented on the basis of appearing to have validity. L is composed of 15 items. The F scale is 64 items with scored response rarely made by unselected normals. K is 30 items identified by statistical means as contributing to a suppressor variable (155).

Cannot Say

The *cannot say* (?) category includes those items which an individual is unable to classify *true* or *false* as the items apply to him. The manual points out that large question scores (those above 100) invalidate the test, and that borderline scores (70-100 items) probably mean that an individual's actual score would deviate more if he had not used the question category so extensively (115). The placing of thirty items in the question category will yield a T-score of 50. Brown (26) has suggested a plan for counting items placed in this *cannot say* group. He proposes that there are certain items, mainly those numbered B 47-55 and C 1-16, which are items that do not apply to most adults. Therefore these items should not be counted if placed in the question category by adults. There are other items which are actually a falsification if placed in the question category because the subject is trying to avoid an answer. He suggests that these latter items be marked in both true and false columns of the answer sheet and counted as one-half unit value. Further research is needed to fully identify these one-half unit items and to provide more justification for changing the present procedure of handling the items in the question score. Krise (136) has called attention to the tendency of psychometrists to omit the question score. He says that this results in erroneous profiles for all scales except hypochondriasis. He calls attention to scoring methods (62, 76, 135, 145, 188) which preclude this error.

Lie Scale

The second validating score, the lie scale, attempts to identify those individuals who try to falsify their score by choosing responses which they feel are most acceptable socially (115). As in the case of the question score, a high score indicates that the true value of the other scales is probably higher than actually obtained. Counseling evidence has shown that more sophisticated subjects are not as apt to score high on L. Cottle (54) found with college level students that the mean L score for 100 cases on the card form was 2.54 raw score points and for the booklet form was 2.73, standard deviation was 1.55 and 1.28, respectively. Hovey (120) discusses three cases of individuals who discovered the scoring purpose of cuts on MMPI cards. He says the lie score in these cases was zero and the K scale was about 21 raw score points. Cofer and others (47) when studying the effect of malingering found that the instructions to fake a normal profile raised mean K and L scores, but that otherwise there appeared no greater test-retest differences than was observed with normals alone. They suggest that an

additive combination of L and K should be used to detect faked 'normal' profiles. In this experiment they used a cut score of 67.

Validity Scale

The validity scale F is used to determine whether the inventory was taken and scored correctly. High scores indicate that the subject was careless, did not understand the items, or that recording and scoring errors were made (115). A fourth possibility is suggested by Kazan and Sheinberg (134) who inspected 37 cases with abnormally high F score. They note that 35 of the 37 cases were definitely valid as indicated by clinical diagnosis. They claim that a high F score is very rarely an invalidating factor with abnormal subjects. Clinical experience indicates that there is a tendency for F to rise with Sc. Schmidt (182) found that the profiles for psychotics rose more sharply at F than for any other clinical group. Schneck (184) found a high F score less valid in a study of character disorders in an Army disciplinary barracks. Cofer and others (47) show that subjects attempting to fake emotional upset were detected easily by the F score. There were no raw F scores under twenty. Another study of faking on the MMPI by Gough (83) also shows that feigned psychotic curves can be detected by being too low on neurotic scales, too high on psychotic scales, and by a significantly elevated F scale. Gough also found that feigned neurotic curves were identified by high F and low K scores. Mechanical sorting using an index of F minus K correctly selected 82 percent of these feigned neurotic profiles. This study, used eleven individuals with a background in psychology or psychiatry as contrasted with controls of thirteen hospitalized paranoid schizophrenics and 57 severe psychoneurotics. Gough concludes that relatively skilled persons are unable to simulate either a psychoneurotic or psychotic condition on the MMPI in such a way as to avoid detection, although the simulated neurotic profiles are more similar to authentic ones than are faked psychotic profiles. Hunt (122) used a group of 109 ASTP students and 74 Navy general court martial prisoners to investigate the effect of deliberate deception. He substantiated Gough's discovery that an index of F minus K correctly identifies a substantial proportion of malingered or faked abnormal profiles. However Hunt claims this index was of no use in detection of faked normal profiles.

A later report on the F minus K index by Gough (91) suggests that the sampling distribution of F minus K is reasonably normal and the index is not particularly distorted by psychiatric abnormality. He presents data from the studies of Hunt and Cofer mentioned above, Sweetland (196), and from an unpublished study by Bird which support the use of F minus K. Gough recommends a raw cutting score of nine for F minus K and presents a table of *phi* coefficients for values of F minus K from zero to 16.

It would appear that high scores on F are caused by carelessness of the subject, scoring errors, psychotic state, or deliberate faking of an abnormal profile. The last of these can be detected by a combination of F minus K scores. The F scale is of little use in detecting faked normal profiles.

Correction Scale

The K scale acts as a suppressor variable and is essentially a corrective factor which is supposed to sharpen the differentiating power of certain clinical scales

(Hs, Pd, Pt, Sc, Ma) (107). It might be described psychologically as a conscious or unconscious attitude which influences a subject's reaction to personality test items. A high score on K indicates the defensive person who tried to conceal abnormal traits and secure a 'normal' score. A low score on K indicates an individual who is excessively self-critical and portrays himself as more abnormal than he really is (155). It is claimed by Hathaway (107) that the correction of the five clinical scales by use of K increases the proportion of "clinically diagnosed cases scoring above the 90th percentile of normals". Jeffery (126) undertook an investigation of the factors influencing answers to K. She found no evidence of distortion due to word meaning and that the differences characterizing high and low K are consistent for both the test and an interview situation. This observed set is persistent and deep-rooted. It evidences itself in items containing temporal adverbs. People answering *true* tend to select categories containing the term 'frequent' and the opposite appears for those answering *false*. Jeffery's data support the assumption that K measures two extremes of a deeply-rooted attitude causing distortion of personality items, but offers little explanation of the dynamics involved. McKinley, Hathaway and Meehl (150) describe the statistical derivation of K weights as an optimal value which operates as a differential ratio in distinguishing a criterion group of abnormals diagnosed for each scale from a sample of unselected normals. They emphasize that this differentiation is only for general population and state "it seems likely that for the best separation of 'maladjusted normals' such as those which abound in a college counseling bureau and would be formally diagnosed in a psychiatric clinic as **simple adult maladjustment,** other weights might be better". Their paper and a number of other studies indicate that there is a tendency for a college educated group to deviate upward one-half to one standard deviation above general population norms. It would seem advisable on the basis of the above evidence to use the K scale cautiously with a college level population, and perhaps use it only as a validating scale in combination with L or F, or, on the basis of Jeffery's evidence, use it as a personality scale in its own right.

A study of the K scale by Schmidt (183) using 98 Army convalescents diagnosed 'normal' found the L scale as good an indicator of falsifying as K. He reports that the basic shape of the profile remains the same, but its height decreases with falsification. He concludes that "the K factor contributes little, if anything, to differential diagnosis". Hunt and others (123) tried to check the discriminatory power of the K scale using psychotic and non-psychotic adult male psychiatric patients. They state that the K scale did not improve diagnosis and failed to reduce 'false negatives' (abnormals scoring in the normal range). In another study using 109 ASTP students and 74 Navy general court martial prisoners Hunt (122) found that the K correction failed to reduce deception. As reported in the discussion of the F scale above, Hunt did find an index of F minus K correctly identifying malingerers, but not faked normal profiles. Cofer and others (47) found K and L scores significantly higher for faked normal profiles and suggest the use of an additive combination of L and K to identify these. Hovey (120) reports that subjects faking answers by using the scoring cuts on the cards can be identified by the fact that the K score is near 21, that there are few 'O' items, and no 'X' items listed on the scoring sheets.

Summary

It would appear that the following conclusions are indicated by research covering the validating scales of the MMPI.

1. Large numbers of items in the *cannot say* (?) category reduce the validity of the clinical scales.
2. Many items in the *cannot say* category represent an attempt to avoid answering and may be classed as falsification.
3. The lie scale (L) will identify only naive subjects and is useful primarily in an additive combination with K to identify abnormal subjects who try to secure a normal profile.
4. The validity scale (F) will identify subjects who are careless or psychotic, and will reflect scoring errors. A combination of F minus K is useful to detect deliberate faking of an abnormal profile (malingering).
5. Except for studies by the authors, K does not appear useful *by itself* to increase the discrimination of the clinical scales.
6. The K scale in combination with L or F is useful to detect deliberate faking on the MMPI.
7. There is evidence that the K scale reflects a persistent, deep-rooted attitude of distorting personality items and may be useful as a clinical scale to identify the defensive or the overly self-critical subject.

Chapter 3

THE CLINICAL SCALES

Let us turn now to a consideration of the clinical scales themselves. They are supposed to measure the degree to which an individual deviates from a normal group in his reaction to items differentiating such a group from a criterion group possessing a characteristic abnormal syndrome of behavior. These scales include Hypochondriasis (Hs), Depression (D), Hysteria (Hy), Psychopathic deviate (Pd), Masculinity-femininity of interest (Mf), Paranoia (Pa), Psychasthenia (Pt), Schizophrenia (Sc), Hypomania (Ma) and Social introversion (Si) (64). A brief description of the meaning of each scale is included in Table 1. New scales have been developed through research of people using the MMPI. These new scales include one associated with socio-economic status called personality status (St) (86), a school achiever scale (Ac) (89), and subtle-obvious scales (S-O) (210).

Studies Contributing to Validity of Original Nine Scales

Hypochondriasis: The MMPI manual (115) describes the revised hypochondriasis scale as "a measure of amount of abnormal concern about bodily functions". It states that persons with high Hs scores are unduly worried over their health and frequently complain of pain and disorders for which no clear organic basis can be found. These complaints are more vague and have a longer history than those of the person with hysteroid symptoms. The authors claim that common organic sickness will not raise a person's score appreciably.

The 48 items* of the Hs scale were selected because they differentiated significantly between a criterion group of fifty cases of pure, uncomplicated hypochondriasis and control groups of normal individuals. One of these control groups was composed of 109 married males and 153 married females aged 26-43 whose social status was comparable to the criterion group. The second control group was 265 unmarried University of Minnesota students. A third group of 50 normals with physical disease and a group of 45 mixed psychotics were also compared to the normal group. McKinley and Hathaway (146) conclude that, although there is a sizeable overlap between normal population and the criterion group, a significant difference between them can be demonstrated. They state that presence of physical disorders or psychotic condition raises the Hs score only slightly above that secured by normals. Similar results were secured by Page (167). Page notes that tubercular patients, both male and female, were significantly higher on Hs, D, and Hy than normal controls, but that they had only slightly higher scores than other hospital controls. The average T-score on Hs was 60 for tubercular patients.

Studies of various possible organic factors connected with hypochondriasis have had conflicting results. Weiner (209) discovered that veterans administration disability groups with ratings for arthritis, gun shot wounds, asthma and ulcers tended to score high on Hs, while those with a diagnosis of malaria did not. Brower (28) using a sample of 48 cases found a high degree of relationship

*There are only 33 items shown on scoring templates and on the IBM scoring stencil in the present form of the scale.

between Hs and pulse rate. He suggests that fears and anxieties of an unstable person may project influences on the circulatory system. Guetzkow and others (97) have shown that scores on the neurotic triad (Hs, D, Hy) rise markedly in experimental semi-starvation and drop again after controlled nutritional rehabilitation. Hovey (121) studied various neurotic reactions. He found that mean Hs score was deviate in all three types: somatization reaction, dissociative-conversion reaction, and anxiety reaction. Of these, 105 somatization reaction patients have mean scores deviate on Hs and Hy, and near deviate on D; and, 60 cases of anxiety reaction have mean scores deviate on D, Hs, Pt, Sc, and Hy, and near deviate on all other scales. Benton and Probst (16) report that a comparison of MMPI scores for 70 cases with ratings by four psychiatrists yield too many false positives on Hs and D. (False positives are normal cases with an abnormal score.) Items from the Hs scale were used by Altus and Bell (9, 10) in an orally administered test with Army illiterates. They show that items from the Hs scale and from the Bell Adjustment Inventory both correlate highly with "riding the sick book" in the Army.

Only a few studies are available at present concerning the meaning of the Hs scale for educational or vocational counseling. Brower (29) found there was a correlation between performance efficiency under visuo-motor conflict and egocentric tendencies or preoccupation with self (Hs, Pt, Sc). Subjects in his group with higher Hs-Hy syndromes tended to be more accurate and perform better in a maze coordination test. In another study Brower performed with 48 college students (27), the highest relationships between the Wechsler-Bellevue and the MMPI were negative coefficients between I. Q. and Hs, Hy, and Pd. Verniaud (200) discovered that as a group clerical workers scored significantly lower on Hs than saleswomen or optical workers, but were essentially the same as a normal population. Daly (60) found some support for this when her results indicated that women with high Hs score have less computational interest on the Kuder Preference Record.

An experiment to produce the Hs syndrome with fifteen normal college students under hypnosis was conducted by Sweetland (196). His attempt yielded no "pure" Hs, but a syndrome which would be clinically diagnosed as hypochondriasis. Sweetland claims that the hypnotic neurosis is neither a simulated state nor a test-taking attitude because he was unable to differentiate the hypnotic Hs profile with an index of F minus K. The number here is sufficiently small to raise a question over the effects of hypnosis on MMPI scores. Two studies by Blum (22) and Bier (19) have tried to differentiate college curricular groups. Significant differences among five college groups of 25 students each on three scales of the MMPI were found by Blum. One of these differences was on Hs with the education group low and the mechanical engineering group high. Bier indicates that Hs is one of five scales of the MMPI most affected by age. There is a general tendency among his five college groups for higher scores at higher age levels. Hs was fourth in a list of six scales that differentiated 171 Catholic major seminarians from other college groups of 753 Catholics.

Arthur (14) used the MMPI with twelfth grade students at Haskell Indian Institute. She found less tendency to high scores on Hs and Hy among Indians than among whites. Arthur suggests that Indian culture may inhibit the development of these syndromes of behavior.

The research presented above shows that there is a definite basis for expecting a high score on Hs with organic diseases or deficiencies having a suspected psychological connection. However, there is not sufficient evidence that one could predict this, nor could it be safely said that organic disease alone cannot produce an abnormal Hs score. The reliabilities of the Hs scale shown in Table 2 are sufficiently low to heed the warning of Benton and Probst about the possibility of false positives and the need to supplement test evidence with that from interviews. There are several strong indications that the scarcity of "pure" cases of hypochondriasis makes the interpretation of this scale by itself of dubious value in psychiatric diagnosis and in psychological counseling. The value of the Hs scale for clinical diagnosis and educational placement would seem to be greatest when one considers its position in the **pattern** of any individual's MMPI scores.

Depression: The manual for the MMPI (115) states that "a high D score indicates poor morale of the emotional type with a feeling of uselessness and inability to assume a normal optimism with regard to the future". A high score also suggests a person who is "characterized by lack of self-confidence, tendency to worry, narrowness of interests, and introversion". On the matter of introversion Lively (139) would appear to have findings which are contrary to those of the test authors. She used the Heidbreder Introversion-Extroversion Scale and the MMPI to discover that extroverts have a tendency toward high scores on D, Pt, and Pd.

The authors of the MMPI feel that the D scale is useful in conjunction with Hs and Hy to identify neurotics. Hathaway and McKinley (113) state that a high score might result from economic or vocational frustration, personal problems, or the depressive phase of cycloid behavior. The 60 items of the final D scale (113) were selected for their ability to differentiate between the criterion group of fifty cases of carefully chosen depressed patients and various control groups. Those items which had too great sex differences have been eliminated, but there is still a trend for female scores to be higher than males and to rise with increased age.

The control groups were a normal group of 129 married males and 200 married females, aged 26-43; a college group of 265 students; 40 normal persons with high D score on the preliminary D scale; and 50 patients without clinically observed depression but with tendency to score high on the preliminary D scale. The criterion group represented relatively pure cases of depression. The greatest number of these were in the depressed phase of manic-depressive psychosis. There is overlap in the distributions of scores from normal to hospital patient to psychiatric patient, but depressed persons can be significantly differentiated from normals.

Schiele and others (180) found that when cases of psychopathic personality were measured soon after they had been identified, D was likely to be high. They emphasize that D in combination with higher Hs and Hy scores is characteristic of severe neurosis and that D alone means depressive reaction. Schmidt (182) says, "The depression scale appears as an index of the seriousness of the difficulty. It is higher than Hs or Hy in psychotic and psychoneurotic groups and lower for normals and constitutional psychopaths." Gough (82) also points out that D is highest in the neurotic triad for psychotics, while Meehl (153) states that it is the most frequent peak score with abnormals. Morris (160) studied

320 naval enlisted men and found the mean D scale significantly above a T-score of 70 for every pathological group except hysterics.

Modlin (158) used the MMPI with 100 normals and 316 experimental patients. The depression cases were the most successfully verified and the MMPI was considered a valuable psychometric instrument. However, Pacella and others (166) tried to use the D scale *alone* to diagnose manic-depressives. They found it of little use. On the basis of this restricted use with 40 cases they conclude the MMPI is useless as a prognostic aid except to determine retention of improvement when used one week after termination of treatment. The use of only one scale of the MMPI in this study would seem to preclude significant results.

Poor prognosis for electronarcosis therapy in the absence of a high D score is reported by Harris and others (106). Those rated much improved tended to score high only on D prior to treatment. Suicidal preoccupation is characterized by a consistent rise in D and Pt according to Simon and Hales (190). They list the items for a suicide scale and suggest its use to identify accident-prone industrial employees. Ruesch and others (178) report that eight male hyperthyroids tended to score highest on D before goiter removal.

Two reports of the Minnesota nutritional studies concern the D scale. Brozek and others (30) in a longitudinal study of eight males under restricted intakes of vitamin B complex found D was most prominent in the period of acute deficiency and the total effect clearest on the neurotic triad. They state that the trend of MMPI scores agreed closely with self-ratings and with man-by-man ratings. Brozek and Erickson (32) report that a study of semi-starvation subjects with reference to items on the D scale shows that half the significant items were psychic rather than somatic items.

There have been a few attempts to check the usefulness of the D scale with reference to educational-vocational counseling. Arthur's study of Indian twelfth-graders (14) indicates that the Indian girls have higher D scores than whites. Lewis (137) reports that 50 white female social workers scored significantly higher than the MMPI norm groups on D and Hy. Johnson (128) found that the D scale is the only MMPI scale significantly correlated with religious attitude among college students. She reports a correlation coefficient of —.29. The relationship between the MMPI and the Hildreth Feeling-Attitude Scales was investigated by Hunt and Lehner (124). They state that the highest relationship found was a biserial coefficient of —.56 between the total feeling score and the D scale.

The foregoing studies of the D scale indicate that it is one of the most important scales of the MMPI. It assumes a different meaning according to whether it is the single high score or is high in combination with other scales. When D alone is high it appears to mean poor morale, pessimism, or reactive depression. That the D scale can have meaning by itself is shown in the studies of male goiter patients, cases with acute vitamin B complex deficiency, patients with good prognosis for electronarcosis therapy, and the finding of negative relationships to a test of religious attitude and to the Hildreth scales.

The varied meanings of the D scale in combination with other MMPI scales are as follows:

1. Higher than Hs or Hy with psychotics.

2. Tendency to be higher than Hs or Hy with severe psychoneurotics and lower than Hs or Hy with mild psychoneurotics and psychosomatic disorders.
3. D and Pt high indicates the potential suicide.
4. Extroverts tend to be high on D, Pt and Pd.
5. D in combination with other scales may be characteristic of certain occupational groups, such as high D and Hy scores for female social workers.
6. Gough (87) claims the D scale is the best single index of adjustment in the inventory.

Hysteria: The MMPI manual (115) describes the Hy scale as measuring the degree to which the individual is like patients who have developed conversion-type hysteria symptoms, either general systemic complaints, or specific complaint areas. The subject with high Hy score may have concurrent physical disorders.

The 60 items in the final Hy scale (149) differentiated the criterion group of 50 hysteria cases from normal groups. One of these groups was 139 married males and 200 married females, aged 26-43, and another was 265 college students. McKinley and Hathaway (149) point out that the psychic items have a marked relation to age and education, while Brozek and Erickson (32) have shown that somatic or physical items contribute most to elevation of the Hy scale in experimental semi-starvation. The mean for the college standardization group is one-half standard deviation higher than the older standardization group. Several other writers have noted the tendency for Hy to be high with subjects of higher intelligence levels. Abramson (3) in a longitudinal study of 28 army officers reports frequency of elevation of Hy and Mf in the intelligent, well-educated individual. Schiele and others (180) give a profile with T-score of 65 on the Hy scale and say, "This is frequently seen in young intelligent persons". Brown (24) indicates that profiles of college students have Hy higher than Hs and D. The high points in these profiles were Hy and Ma.

Successful diagnoses of hysteria and schizophrenia are reported by Michael and Buhler (156) where the MMPI was used only to clarify diagnosis in 171 complex cases. Hovey (121) found that 34 dissociative-conversion patients were deviate on Hy and Hs and near-deviate on D. Results of a study by Ruesch and others (178) show that 35 female hyperthyroids, verified by goiter removal, tended to score highest on Hy. Delayed recovery was greatest with higher scores in the neurotic triad. The investigation of tubercular patients by Page (167) reported previously also showed a tendency for higher scores on the neurotic triad.

Not many studies applicable to counseling have found the Hy scale significant. In a study of errors in pilot training O'Gorman and Kunkle (164) state that there is a tendency for high scores on Hy and Ma to be associated with 'pilot error' in general. Daly's study (60) of the Kuder Preference Record and the MMPI showed that women with high Hy scores liked artistic activities and disliked clerical activities.

Because the Hy scale is composed of both somatic and psychic items and is highly related to Hs and D, it is difficult to present the research pertaining to Hy in meaningful form. It would appear that psychic items are related to age and intelligence. Young people of high intelligence tend to score high on Hy. The research of Brozek and Erickson, of Ruesch, and of Page tend to empha-

size the part played by somatic items in high scores on the Hy scale. The psychiatrically diagnosed hysteric definitely scores high on Hy. Persons with a tendency to make mistakes appear to score high on this scale, also.

These miscellaneous facts tend to obscure the meaning of the Hy scale by itself and seem to indicate, as in the case of Hs, that Hy is more meaningful in the general configuration, or pattern, of MMPI scores, particularly in the neurotic triad.

Psychopathic deviate: The manual (115) states that the Pd scale measures similarity to persons who show absence of deep emotional response, inability to profit from experience and disregard of social mores. Most frequent digressions of this group include lying, stealing, alcohol or drug addiction, and sexual immorality. McKinley and Hathaway (149) point out that the 50 items which comprise the Pd scale are grouped according to social maladjustment, depression, absence of strongly pleasant experience, paranoid trends, and over-perfect tendency. The normal group contained 294 males with mean score of 12.99 and sigma of 4. and 397 females with mean score of 13.44 and sigma of 4.23. They also state that there is a tendency for Pd to be related to Ma and Pa. A tendency for subjects with conduct disorders to score high on Pd and Ma with neurotic triad low and some elevation on Hy is reported by Meehl (153).

Schiele and others (180) discuss the MMPI results of 100 federal reformatory cases. They present a sample profile with peak at Pd and say that if other peaks occur in these cases "the tendency is for them to be at Pa or Sc". Schneck (185) found a double-spike pattern having elevations on Pd and Ma in a study of 221 male inmates of an army disciplinary barracks. Bolander (23) reports significantly higher Pd and Ma scores for underachievers at the college level. Higher Pd scores for Indians than for whites is reported by Arthur (14). Capwell (39) states that the greatest differentiation between delinquent and non-delinquent girls for five tests was shown by the Pd and Pa scales of the MMPI. A study of optical workers by Verniaud (200) indicates that they tend to score high on Pd and Pa. Verniaud's group seems to be from low socio-economic levels and older, but possibly is comparable to that of Capwell. O'Gorman and Kunkle (164) report that high Pd score is related to taxiing accidents in pilot training.

A longitudinal study of a single case of severe psychoneurosis after treatment by prefrontal lobotomy is reported by Andersen (12). In this case the Pd scale continued to rise on retests and the psychotic scales dropped. Andersen claims this change from psychoneurotic profile to psychopathic profile was faithfully reflected in clinically observed personality changes.

Study of 314 male alcoholics versus 222 male non-alcoholics was conducted by Manson (144). The results indicate that 39 items of the Pd scale were diagnostic at the five percent level or better. Abramson (4) studied results after drinking alcohol by normals. He states that the basic profile remains unchanged but that most fluctuations occur on the Pd and Mf scales. Another study by Harris and Ives (105) matched 19 alcoholics with 19 mixed psychoneurotics. They found that alcoholics followed the general neurotic structure but had a greater Pd score. There was a significant emphasis by alcoholics on items related to self-rapport. There was evidence of considerable intra-individual conflict in alcoholics with less general social-emotional upset. Brown (25) reports in a study

of 80 clinically diagnosed chronic alcoholics that they can be divided into two groups, those with D elevated in the neurotic triad and those with Pd elevated.

Several studies have reported negative results for the Pd scale. Van Vorst (199) says that after using the MMPI with a "small" number of psychopathic boys the results do not justify any characteristic response pattern. Monachesi (159) found significant differences between delinquent and non-delinquent girls, but not between delinquent and non-delinquent boys. The delinquent boys were higher on Pt and the non-delinquent boys were higher on Pd.

In a study of five college groups Bier (19) indicates that Pd and Pt show the least intergroup differences. Wiener's study (209) of disability groups shows that the malaria group is lower than normals on Pd and Mf, and that the ulcer group is lower on Pd, Mf, and Pa. The Pd scale changed least in a study of experimental semi-starvation reported by Schiele and Brozek (181).

A summary of the studies reported above indicates that the Pd scale is useful in identifying character disorders, particularly alcoholics and delinquent girls. It has not been as useful in identifying delinquent boys. This latter finding may be reflecting the fact that delinquent girls are more frequently identified by sex offenses. The Pd scale seems less useful in differentiating students in various college curricula, except the underachievers (Pd and Ma). The Pd scale may be useful when interpreted with Ma or Pa. This needs further study.

Masculinity-femininity: The manual for the MMPI (115) states that this scale measures the tendency of an individual to have a basic interest pattern in the direction of the opposite sex. It says "The items were originally selected by a comparison of the two sexes". Although each item chosen in the final Mf scale showed a trend in the direction of femininity on the part of male sexual inverts, the manual specifically warns that **a high Mf score is not sufficient evidence of homosexuality.**

Research on the Mf scale falls into three categories: that dealing with college males, with sexual psychopaths and with aspects of vocational selection. In addition there have been two studies dealing with psychosomatic aspects of masculinity-femininity. Schiele and Brozek (181) report that a slight drop in Mf scores of 32 males in an experiment in semi-starvation is consistent with a clinical impression that femininity tends to decrease as neurotic reactions develop. Wiener notes (209) that malaria and ulcer disability groups tend to score low on Mf as well as Pd.

An indication that college males tend to score high on the Mf scale is reported by Brown (24). This receives support from a number of other studies. Bier (19) states that the greatest difference between a seminary group and college groups in law, medicine, dentistry and a general college course is on the Mf scale. Kahn and Singer (130) report that business majors score about one standard deviation above MMPI norms on the Mf scale. In a study of religious attitudes among college students Johnson (128) says that males with high religious attitude scores tended to have higher Mf scores. In an experiment with 51 male and 51 female teachers college sophomores Nance (163) gave the MMPI, Strong Vocational Interest Blank and Guilford-Martin Inventory of Factors GAMIN. A higher correlation of Mf scales for men is reported, although both sexes scored higher than general population norms. Music education students were the most feminine of the group. Similar findings for music education students exist in an unpublished study by Cottle. Heston (118), using the Mf scales of the MMPI,

Strong, Kuder and the DePauw Adjustment Inventory, found these Mf scales 80 percent satisfactory in placing men above and women below the mean score. The MMPI Mf scale was the most effective in doing this, although all four scales appeared satisfactory. In a comparison of 50 veterans with 56 non-veterans Fassett (74) reports that more veterans have a T-score of 70 or above on the Mf scale.

A preliminary attempt at pattern analysis of MMPI profiles by Schmidt (182) showed that constitutional psychopaths with homosexual trends tended to score high on Mf whereas in all other groups the profile is depressed at this point. Burton (34) found a significant difference on Mf between 34 homosexuals and a combined group of 20 rapists and 87 delinquents. Burton, reporting a test-retest reliability for the Mf scale of .70 (see Table 2), concludes that such reliability is too low for individual clinical use. Leverenz (138) states that subjects with abnormal sexual behavior invariably had a high Mf score. When Benton (15) retested nine homosexuals with instructions to fake normal, six were able to secure normal scores.

Because of the need for additional data in diagnosis of homosexuality and the ease with which such information can be concealed on the MMPI, the Mf scale of the MMPI would appear most useful at present as an interest scale for counseling and guidance. Daly (60) notes that women who score high on Mf (masculine) like mechanical, computational, and scientific activities, and tend to dislike activities involving reading and literary pursuits. Verniaud (200) reports that saleswomen score high on Mf and low on the psychotic triad. Cottle and Powell (55) used 50 males scoring high and 50 males scoring low on the MMPI Mf scale to investigate relationships on the Strong Vocational Interest Blank, the Kuder Preference Record and the Bell Adjustment Inventory. They found that selection on a single scale gave evidence of relationships that are obscured in larger studies of interest and personality. People who score high on the Mf scale show greater sensitivity to environment and warmer feelings toward others. Such individuals are interested in people, language, reading and music, and dislike mechanical activities. Loth (140) reports a divergence from normal expectancy using chi-square techniques for the Mf scale and the sociability scale of the Guilford-Martin Inventory of Factors STDCR.

An unpublished preliminary study by Harder[1] compared and analyzed results of 38 music education students and 38 randomly selected counseling bureau cases on the Mf scale. He found that there were nine items of this scale common to both groups, six items peculiar to the undifferentiated college students and seven items peculiar to the music education group. This may become a way to differentiate curricular and occupational groups on the Mf scale of the MMPI.

In a factorial study of the MMPI, Strong, Kuder and Bell Inventories using a population of 400 adult males Cottle (53) found a factor called "things versus people". The MMPI Mf scale had a loading of .23 which was below the cutting point of $\pm .33$ for significance. The Strong and Kuder Mf scales had loadings of .68 and .82 respectively. Positive loadings indicated a liking for mechanical and scientific activities and negative loadings indicated an interest in dealing with

[1]D. F. Harder. "A Comparison of MMPI Answers of Music Education Students and Undifferentiated College Students on the Mf Scale." Guidance Bureau, University of Kansas, Lawrence, Kansas, 1951.

people, inanimate objects and linguistic activities. In another factorial study of 111 submarine crewmen Cook and Wherry (48, 49) report a similar factor. The Mf scale of the MMPI, Pt and personal history items of a navy personality inventory had positive loadings and a mechanical aptitude test had negative loadings. In this case the Mf scale indicates femininity, in Cottle's study it indicates masculinity. Both of the studies emphasize the interpretation of the interest scale as liking for mechanical and scientific activities versus people, language, and ideas; or, as things versus people.

The research on the Mf scale of the MMPI indicates that this scale may be interpreted as follows:

1. College males tend to score higher than general population.
2. A high score for men means an interest in people, language and ideas.
3. A high score for women means an interest in mechanical, computational and scientific activities.
4. A high score may accompany other evidence of homosexuality.
5. Homosexuals can achieve a normal score, if they desire to do so. Fudging is possible.
6. The Mf score may be useful in differentiating aptitude for various college curricula. Seminarians and music education students score high on this scale.

Paranoia: There is little research to expand the interpretation of the Pa scale given in the manual (115). This states that the Pa scale was derived by contrasting normal persons with a group of clinic patients characterized by suspiciousness, oversensitivity and delusions of persecution. Hathaway and McKinley (115) state that although valid T-scores of 80 and above are nearly always indicative of disabling abnormality, "the range from 70-80 must also be checked by clinical judgment".

As stated in a discussion of the Pd scale, Verniaud (200) found that women optical workers had significant scores on Pa and Pd. Hathaway and McKinley (149) also emphasize a tendency for Pa and Pd to be related, as do Schiele and others (180), Capwell (39), and Wiener (209).

Brown (24) reports that college females tend to score high on Pa. Altus and Bell (10) found oral items of the Pa scale were more valid than an oral Army adjustment scale in an item analysis based on use with Army illiterates.

It would appear that other than a tendency to be related to Pd and a tendency for college females and female delinquents to score high, there is little evidence concerning the meaning of the Pa scale.

Psychasthenia: The manual (115) claims that the Pt scale measures similarity of an individual to psychiatric patients troubled by phobias or compulsive behavior. It states that a psychasthenic tendency may be manifested by a mild depression, excessive worry, lack of confidence, or inability to concentrate. Hathaway and McKinley (115) report that Pt has a correlation with Sc of .75 for abnormals and .84 for normals. Correlations reported by Cottle and Powell (56) support the latter finding reported by the test authors. They also report that random answers to the MMPI produce a correlation of .19 between Pt and Sc.

McKinley and Hathaway (147) state that the Pt scale may be interpreted as indicating excessive doubt, compulsions, obsessions or unreasonable fears and is often accompanied by anxiety. The criterion group of in-patients is small and inclined to be heterogeneous. It was 20 psychiatric cases carefully selected as

probably Pt cases in final diagnosis. Control groups were composed of 139 married males and 200 married females from general population, aged 26-43, and 265 college students. A final scale of 48 items was constructed by selecting items which differentiated two or more times the standard error of the difference between the criterion and normal groups. Little change of score with age is reported, although the college group differs markedly from a general population group of the same age. A corrected split-half reliability of .91 $\pm$.07 for 200 normal cases is reported by Hathaway and McKinley (147) and Cottle reports a pearsonian coefficient between card and booklet form for the Pt scale of .90 for 100 normal cases (see Table 2). A corrected split-half reliability of .94 $\pm$ .10 for 100 psychiatric cases selected at random is also reported (147). McKinley and Hathaway (147) suggest that "many persons tend to have the psychasthenic type of fears in greater degree as their morale becomes lower".

Other studies deal primarily with relationship of the Pt scale to other scales. The only research giving results for Pt alone are those of Jensen and Rotter (127) and Rosen (172). Jensen and Rotter attempted to use the Pt scale as an indicator of emotional stability in officer candidate screening. They found that it did not produce significant differences. Rosen studied relationships between the Schellenberg Free Association Test and the MMPI with 110 white college females. The relationship between the Pt scale and the first 100 words (the Kent-Rosanoff list) of the Schellenberg test was significant beyond the one percent level.

The research of Bolander (23) which showed significantly higher scores for college underachievers on Pd and Ma also indicated a tendency toward higher Pt scores. The attempt to develop a suicide scale by Simon and Hales (190) emphasizes a tendency for potential suicides to have higher scores on D and Pt. Meehl (153) states that profiles with T-score of 85 on Pt, 75 on Sc and marked elevation of the neurotic triad identify cases of psychoneurosis with poor prognosis. He also states that K has a high negative correlation with Pt.

Loth (140) reports that high scores on Pt and Sc are accompanied by high scores on D and C of the Guilford-Martin Inventory of Factors STDCR. Wesley (206) found the highest relationships between the MMPI and the Guilford-Martin Inventory of Factors O AG Co to be correlations of .62 between objectivity (O) and Pt and Sc for 110 college females.

In summary these studies of the Pt scale indicate it has little meaning by itself. It must be considered in relation to scores on other MMPI scales, particularly Sc. Patterns which include the Pt scale are as follows:

1. D and Pt high indicate potential suicide.
2. Pd, Ma and Pt high are characteristic of college underachievers.
3. Pt higher than Sc and elevation of the neurotic triad indicates a psychoneurotic with poor prognosis.
4. Psychosis is indicated by a profile where Sc is higher than Pt; F is high; Pa or Ma markedly elevated; and in the neurotic triad there is a distinct spike at D with Hs and Hy falling much lower.
5. Bier (19) indicates that Pt shows little difference between five college curricular groups.
6. Monachesi (159) notes that delinquent boys score higher on Pt and nondelinquents on Pd.

Schizophrenia: The MMPI manual (115) describes the Sc scale as measuring responses characterized by bizarre and unusual thoughts or behavior. About 60 percent of observed cases diagnosed as schizophrenia are identified by the Sc scale. It is not too useful with some paranoid types or with relatively pure schizoid behavior. In spite of the high degree of relationship existing between Sc and Pt, Hathaway and McKinley (115) claim that "about twice as many cases diagnosed as schizophrenia obtain above borderline Sc scores as obtain such scores on Pt".

Gough (82) points out that Pa and Sc are usually higher than Pt with paranoids, and Pt and Sc are higher with schizophrenic patients. Meehl (153) describes psychosis as a markedly elevated profile with Sc greater than Pt. Other characteristics of this profile have been described in the summary for the Pt scale. Rubin (174) did an analysis of variance of four small clinically diagnosed groups. There was a significant difference for 33 psychotics on Sc without K. Rubin feels that the K scale decreases the discrimination. Hales and Simon (100) tested 20 diagnosed schizophrenic patients with the MMPI before and after insulin shock therapy. The highest mean scores were F, Pa and Sc. These decreased with improvement, while K increased. Retest after two months therapy indicated continued improvement. In a discussion of MMPI patterns for convulsive therapy patients Harris (103) found poor prognosis associated with a clinical diagnosis of Sc and with a clinical diagnosis of severe psychoneurosis showing high scores on the psychotic triad. However when Pacella and others (166) tried to use the Sc scale alone to identify convulsive therapy patients and to secure a prognosis, they found it of little value.

A number of studies have been made which concern the value of the Sc scale for educational or vocational counseling. Crook (58) found the Sc scale useful in selecting women's army corps recruits.

Blum (22) in a study of the SVIB and MMPI reports significant differences among five college curricular groups on the Sc scale with medicine high and mechanical engineering low. Kahn and Singer (130) indicate that college juniors and seniors in business who were frequently on probation had significantly high mean scores on Sc when contrasted with juniors and seniors with excellent academic records. Wesley and others (207) selected the top and bottom 25 percent of college students on the basis of agreement or lack of agreement between interest and ability pattern. Concerning the MMPI they say, "Although only one significant difference (for the schizophrenic scale) was found, the group having highest agreement between interests and abilities showed scores on eight of these scales above those of the other group and in a direction away from the level of 'normal' adjustment". Altus (7) used a normal college population of 100 general psychology students to compare the MMPI and the Rorschach. He used the 25 highest and lowest subjects on the Sc scale to select Rorschach items and secured ten items. He states that "Whatever the Sc scale is measuring, the Rorschach items are measuring to an appreciable degree also." He feels that use with abnormals would increase this relationship.

The research reported above on the Sc scale seems to indicate the following:

1. High scores on F, Pa and Sc are secured by psychotics.
2. Sc tends to be higher with psychotics and Pt tends to be higher with psychoneurotics.

3. Prognosis is poor for psychoneurotics with high scores on psychotic triad.
4. Preliminary evidence indicates the Sc scale may be useful for vocational-educational selection.
5. A high score on the Sc scale may indicate a poor prognosis for college curricula in business.
6. The Sc scale appears to be measuring the same thing as certain Rorschach items.

Hypomania: The manual (115) states that the word hypomania refers to persons with a lesser state of mania, characterized by marked overproductivity in thought and action which they fail to carry through to a successful conclusion. Hathaway and McKinley (115) state that the Ma scale clearly identifies about 60 percent of diagnosed cases and yields a T-score in the 60-70 range for the remaining 40 percent. In a report on the construction of the Ma scale McKinley and Hathaway (149) state that it refers to milder degrees of excitement occurring typically in the manic-depressive psychoses, an elevated but unstable mood, psychomotor excitement, and flight of ideas. The criterion group was 24 cases of abnormals. They contrasted these with a normal group of 139 married males and 200 married females to secure the 46 item Ma scale. A mean score of 14.51 and sigma of 4.42 is reported for 294 normal males and a mean of 13.65 with sigma 4.50 is reported for 379 normal females. They state also that there is a tendency for Pd to be indicated by the Ma scale and for a high Ma score to indicate brain deterioration.

Schneck (185) reports a double spike pattern on Pd and Ma with inmates of an Army disciplinary barracks. Lough (141, 142) states that a tendancy to high Ma score characterizes women college students. Verniaud (200) notes that a tendency to high Ma for industrial women is the most marked deviation of three groups. Altus (8) made a study of underachievers in a college psychology class. He reports that the only MMPI scale to show significance at the .01 level was Ma between means of groups. Bolander (23) also found significantly higher Ma and Pd scores for underachievers at college level. Bier (19) states that the area of greatest differences between means of five college curricular groups was on Ma and the neurotic triad.

O'Gorman and Kunkle (164) in a study of pilot error state that high Ma is associated with all pilot error. In Abramson's report (3) of a longitudinal study of 28 officers he notes that lack of adaptation or impairment of learning is correlated with high Ma, L and F, as well as general elevation of the scores. The mean profiles of psychiatric groups reported by Schmidt (182) show that Ma is low for all groups.

The Ma scale seems to be indicating the following:

1. There is a tendency for Pd and Ma to be related.
2. A high Ma score may be reflecting manic-depressive tendencies.
3. High Pd and Ma scores may identify the college underachievers.
4. There is a tendency for females to score high on Ma.
5. A high Ma score may be reflecting poor or inadequate performance.

Research Producing New Scales

Psychologists using the MMPI have developed scales to measure other factors than those originally presented by the test authors. Most of these new scales require the administration of the complete 550 items of the test. Any individual

desiring to prepare a scoring stencil for these new scales will find the items listed in the articles describing the appropriate scale.

A social introversion-extroversion scale (Si) for the MMPI was developed by Drake (64) and is now included in the new MMPI manual. Although the Si scale was developed on a female norm group, Drake claims that the derived scale appears to have equally good validity for both male and female students because sex differences are very slight. It was constructed by selecting 50 female college students scoring high and 50 scoring low on the five scales of the Minnesota T-S-E Inventory. Analysis of MMPI answers of these two groups produced the 70 item Si scale. Drake and Thiele (66) found a significant difference in Si mean scores between college students participating in no activities and those in two or more activities. A high score means introversion. Gough (90) used the Si scale in his studies and reports that students with higher Si scores tend to participate in fewer activities. However, the regression of activities on Si is curvilinear.

One of these new scales is "personality status (St)". This is related to socio-economic status and was developed by Gough (84, 86. 87, 88) from the MMPI items. Gough says that analysis of MMPI records of high school seniors who were differentiated on socio-economic status yielded a group of items which sharply discriminated the two samples and gave reasonably high correlations with objective indices of status. He suggests that there is a characteristic configuration of verbal behavior related to socio-economic status.

In the construction of this scale Gough (86) used a sample of 90 boys and 133 girls from 12th grade in a Minnesota town of 25,000. He gave them the MMPI, Maslow Security-Insecurity Inventory, the Sims Score Card and an intelligence test. Separating the group at one sigma above and below the mean on the Sims Score Card he secured 38 individuals of high and 38 individuals of low status. There was a significant difference on I. Q. and three year grade point average in favor of the high status group. An item analysis of the MMPI produced 34 significant items. They fall into five groups: literary-aesthetic attitudes; social poise, security and confidence in self and others; denial of fears and anxieties; broad-minded attitude toward morals, religion and sex; and positive, dogmatic, self-righteous opinions. These items have a split-half reliability of .739 $\pm$ .065 with a group of 223 high school seniors and a test-retest reliability of .869 $\pm$ .100 with a group of 101 high school seniors. Correlation with the Sims Score Card (N=223) was .676 and with the American Home Scale (N=263) was .50 $\pm$ .06.

Gough (87) investigated the relationship of the St scale to other variables. He states that higher St scores indicate better adjustment, less insecurity, higher intelligence, higher math and English achievement, superior high school academic record, higher Mf and are negatively related (—.58 $\pm$ .07) with Drake's Si scale for the MMPI. In a fourth report on the St scale Gough (88) states that social mobility attenuates the St score. Groups anticipating higher future income attained higher St mean score. Scores on the St scale do not appear to indicate a difference on the school achiever scale (Ac), the Levison Sanford Anti-Semitism scale, or the D scale of the MMPI.

Subtle and obvious keys for the MMPI were developed by Wiener (210). He found that the obvious items distinguished abnormals from normal population, while the subtle items tended to distinguish personality characteristics of normal

groups. The Hs, Pt, and Sc scales were nearly all obvious items so S-O keys were developed only for the D, Hy, Pd, Pa and Ma scales. Elevation on the obvious scales tends to predict failure in school. Weiner claims that the S-O keys differentiate intelligence (S equals high, O equals low) and that a check on successful versus unsuccessful school work and training showed a significant difference on all scales for obvious items.

Closely allied to this study of Wiener's by inference is the high school achiever scale (Ac) developed by Gough (89). He matched two samples of 27 high school seniors on Otis I. Q. and sex and split them according to three-year honor point ratio. When they were compared on the MMPI, Maslow Security-Insecurity Inventory, Otis and Pintner I. Q.'s, honor point ratio and Sims Socio-Economic Score Card, the only significant difference was honor point ratio. Item analysis with *phi* coefficient identified 34 items. The multiple correlation coefficient for a new group correlating Ac and Otis with honor point ratio was .68. However the split-half reliability of .62 was too low for individual use and guidance. Gough claims that MMPI peaks at Ma, Pd, or Pt may indicate underachievement.

Summary

The foregoing discussion of the research available for each of the clinical scales of the MMPI seems to indicate that few of the scales are important in their own right for diagnosis of abnormals. Instead they are more useful in patterns for identification of general types of abnormality and to help clarify complex diagnoses. Preliminary evidence indicates that they may be useful for educational and vocational counseling but only when the validating scales are included in the diagnosis.

The Hs scale tends to increase in score from normals to somatic illnesses to psychosomatic conditions. It is most valuable when considered in the pattern of all scores, especially the neurotic triad.

The D scale has been called "the best single index of adjustment in the inventory". The height of the D scale is an indicator of the seriousness of the abnormal condition. A high score on this scale may be a prerequisite in a prognosis of successful therapy. When the D score alone is high it appears to mean poor morale, pessimism, or reactive depression. The height of the D scale in comparison to other scales, such as Hs and Hy, Pt, or the psychotic triad, may distinguish between a diagnosis of mild psychoneurosis, and severe psychoneurosis, potential suicide or psychosis, respectively.

The combination of psychic and somatic items on the Hy scale tends to make diagnosis difficult. Psychic items seem to be related to age and intelligence, because young people of high intelligence tend to score high. Somatic items produce high scores in this scale for individuals with organic disturbances. It has been definitely established that the psychiatrically diagnosed hysterics and the individual prone to error tend to score high on this scale. Because of these variables it is more meaningful to consider Hy with respect to its place in the entire configuration of scores, particularly the neurotic triad.

The Pd scale is useful in identifying character disorders, especially alcoholics and delinquent girls. Considered in relation to Ma it is useful in identifying college underachievers. It is most frequently related to Pa or Ma.

The Mf or Interest scale has been used to study college males, sexual psychopaths and selection of vocations. College males tend to score high on this scale.

It seems to mean an interest in people, language, and ideas when males score high. When employed females score high an interest in mechanical, computational and scientific activities is indicated. A high score on the Mf scale may accompany other evidence of homosexuality, but homosexuals can achieve normal scores if they wish to do so. The relation of the Mf scale to selection of educational curricula and vocations is indicated, but needs extensive study.

It would appear that aside from relationship to Pd and a tendency for females to score high, the meaning of the Pa scale is not clear at this time.

Studies of the Pt scale indicate that it has little meaning by itself. It must be considered in relation to scores on other clinical scales, particularly Sc. It is usually higher than Sc in the profile of severe psychoneurotics, but lower than Sc in a psychotic profile. In combination with a high D score it is found in the profile of the potential suicide. General clinical counseling experience indicates that it tends to rise in periods of stress for college students.

A summary of reports concerning the Sc scale shows that high scores are secured by psychotics on F, Pa and Sc. Pt tends to be higher than Sc in psychoneurosis. The Sc scale may be useful in vocational-educational selection. For example, a high score on Sc indicates a poor prediction for success in college business curricula. It would appear that the Sc scale is measuring somewhat the same thing as certain Rorschach items.

A high score on Ma may be reflecting manic-depressive tendencies or poor performance generally. There is a tendency for Ma to be related to Pd, particularly with college underachievers. There is also a tendency for females to score high on Ma.

New scales have been developed to measure things other than those in the original scales. Drake has developed an Si scale where high scores indicate social introversion. Gough has developed an St scale which is correlated with socioeconomic status. He has also developed an achiever scale which he does not consider too effective at present. Subtle-obvious keys were developed by Wiener. He found that the obvious items distinguished abnormals from normals, while subtle items tended to distinguish personality characteristics among normal groups. Weiner claims that a high S score characterizes high intelligence and high O score low intelligence and failure in school.

Two new scales for dominance and responsibility have been developed by Gough, McClosky and Meehl (94, 95). Gough (93) has also developed a scale for measuring anti-semitism. Several other scales have been developed but have not yet been validated.

Chapter 4

PATTERN ANALYSIS

Early studies of the MMPI emphasized the attempts to interpret the meaning of specific clinical scales. Use of this instrument, however, soon indicated that most clinical diagnoses are too complex to warrant an interpretation in terms of a specific scale. Hence diagnosis based on the pattern of scores was attempted. The syndromes which compose the clinical scales seem to divide naturally into three main patterns. The first of these is the neurotic triad composed of the Hs, D and Hy scales. Another is the psychotic triad composed of Pa, Pt and Sc. A third is found with conduct disorders and is composed of combinations of the Pd scale with Mf, Ma, Pa, or the neurotic triad.

Neurotic, Psychotic, Psychopathic Patterns

A number of studies have mentioned the neurotic triad. Ruesch and Bowman (179) used the neurotic triad with a mean total T-score of 150 and standard deviation of 30 to describe post-traumatic syndromes following head injury. They state that mean total score on the neurotic triad in cases of chronic head injury resembles that found in psychoneurosis but tends to be slightly lower. Ruesch and Bowman note that a common feature of late post-traumatic syndromes was an abnormal high score on the neurotic scales and the large number of diffuse complaints. Averaging the scores on the neurotic triad to secure an "anxiety" score is suggested by Modlin (158). He stresses the importance of combinations of multiple scores. Ruesch (176) suggests using the difference between the neurotic and psychotic triads as an index of the prevalence of neurotic or psychotic symptoms.

Schmidt (182) had four Army Air Force neuropsychiatrists make a diagnosis of 219 cases and then investigated the MMPI profiles for each case. The diagnoses identified 98 normals and 121 deviates. The deviates were classified as follows: constitutional psychopathic state, inadequate person (N=11); constitutional psychopathic state, sexual psychopathy (N=7); mild psychoneurosis (N=26); severe psychoneurosis (N=64); and, psychosis (N=13). Profiles for these five groups are shown in Figures 1 through 5. Schmidt states that the position of the D scale in the neurotic triad is an index of the seriousness of the difficulty. It is higher than either Hs or Hy in the severe psychoneurotic and psychotic groups and lower than Hs and Hy for all the others. He notes a decrease on all profiles for the Ma scale. The neurotic triad is higher than the psychotic triad for both psychoneurotic groups.

Gough (82) gives profiles, means and standard deviations for 26 normals and various deviate groups. The deviates were classified as follows: mild psychoneurosis (N=12); moderate psychoneurosis (N=24); severe psychoneurosis (N=57); psychopathic personality (N=21); paranoid psychotic (N=11); non-paranoid psychotic (N=11); schizoid psychotic (N=12); and non-schizoid psychotic (N=10). Profiles for four of these groups are shown in Figures 1 through 5. Gough points out that the neurotic triad is higher than the psychotic triad in all psychoneurotic curves, and that the peak increases with the increasing severity of the case.

Meehl (153) lists the criteria for abnormal profiles without the Mf scale. He states that the most frequent peak with abnormals is the D scale. He gives the following characteristics for a psychoneurotic profile: The general profile is less elevated with the neurotic triad more elevated than the rest of the curve; the three scores of the neurotic triad close to one another; Pt greater than Sc; lower F scale; and, Pa and Ma relatively normal. Meehl claims that a profile with marked elevation of the neurotic triad, Pt a T-score of 85 and Sc a T-score of 75 is a psychoneurotic profile with poor prognosis.

Guthrie (99) describes two groups of psychoneurotics in his attempt to establish patterns for 89 diagnosed abnormal psychiatric patients. He presents a mean profile for 12 cases diagnosed as psychoneurosis, anxiety state. This profile shows highest scores in the neurotic triad with spike at D and secondary peak at Pt. The mean profile for 19 cases diagnosed as psychoneurosis, inadequate personality, shows highest scores in the neurotic triad with Hs and Hy higher than D.

Schmidt, Gough, Meehl, and Guthrie all agree that the neurotic triad is more marked in the profile of psychoneurotics. Profiles presented by Gough and Schmidt are shown in Figures 1 and 2.

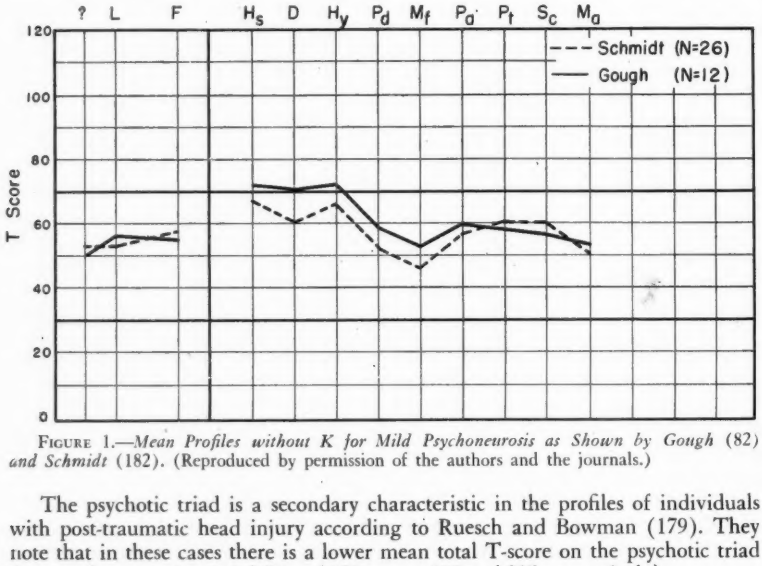

FIGURE 1.—*Mean Profiles without K for Mild Psychoneurosis as Shown by Gough* (82) *and Schmidt* (182). (Reproduced by permission of the authors and the journals.)

The psychotic triad is a secondary characteristic in the profiles of individuals with post-traumatic head injury according to Ruesch and Bowman (179). They note that in these cases there is a lower mean total T-score on the psychotic triad than on the neurotic triad (170 and 171 versus 198 and 205, respectively).

Schmidt (182) reports that D, Sc, Pa, Hs, and Pt in descending order tend to be the highest scores with psychotics. He has noted that D tends to be appreciably higher than Hs or Hy and that F rises more sharply for the psychotic group. Gough (82) also notes that the curve for psychotics is diphasic with D highest in the neurotic triad. He states that Pa and Sc are usually higher than Pt with paranoids and that Pt and Sc are higher for schizoids. In addition he

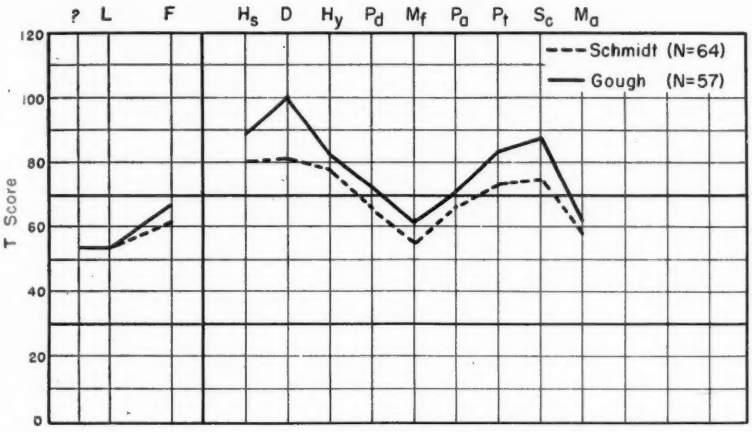

FIGURE 2.—*Mean Profiles without K for Severe Psychoneurosis as Shown by Gough* (82) *and Schmidt* (182). (Reproduced by permission of the authors and the journals.)

points out that a score on the F scale of more than 16 raw score points distorts Sc and Pa most because of item overlap. Meehl (153) describes psychosis as follows: a markedly elevated profile; high F scale; Sc greater than Pt; Pa or Ma markedly elevated; the psychotic curve reaching the level of the neurotic curve; and, a distinct spike on D with Hs and Hy falling far below D. Guthrie (99) divides his psychotic cases into three groups. The first group is 15 cases diagnosed as paranoid schizophrenics with peak scores at Pa and Sc and secondary elevations on the F and Pd scales. The second group is seven cases diagnosed as psychotic depressive with peak at D, secondary peak at Pt and Ma below a T-score of 60. The third group is composed of 11 cases diagnosed as manic with peak score at Ma, secondary peaks at F, Sc and Pd and the neurotic triad just below a T-score of 50. Profiles for 80 schizophrenics and for 33 young schizophrenics from a study by Wauck (202) are presented in Figure 3.

Thus we find general agreement between Schmidt, Gough, Meehl and Guthrie concerning the main characteristics of a psychotic profile, although Guthrie is more specific than the others. Profiles presented by Schmidt and Gough are given in Figure 4.

A pattern for the conduct disorders on the MMPI centers around combinations of the Pd scale with Mf, Ma, Pa and the neurotic triad. Schmidt (182) reports that for seven cases of constitutional state with sexual psychopathy the profile rises on the Mf scale, whereas in all other groups the curve is depressed at this point. Gough (82) states that the psychopathic curve has Pd higher than any psychoneurotic curve but on the same decile plane with the neurotic triad. Meehl (153) describes the conduct disorder profile as follows: elevation on Pd; elevation of Ma, if not too high, and especially with secondary peak at Pd; neurotic triad low with some elevation at Hy; and, the psychotic triad about 60. A "double spike" pattern with elevations on Pd and Ma has been identified by Schneck (185). This was for 221 males in an Army disciplinary barracks with

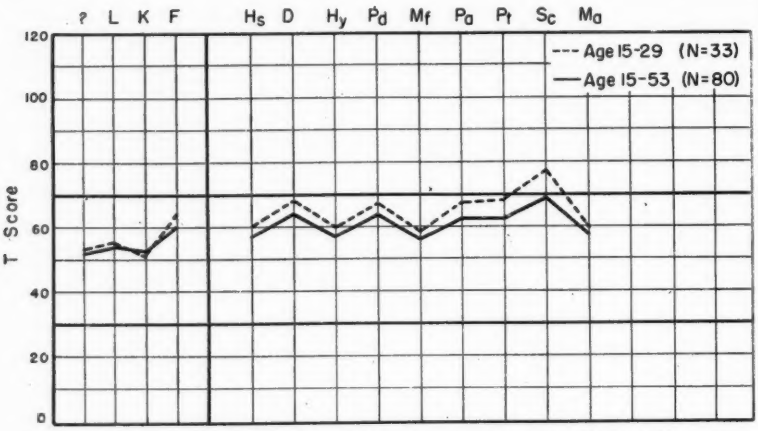

FIGURE 3.—*Mean Profiles with K for Schizophrenics as Shown by Wauck* (202). (Reproduced by permission of the author and the *Journal of Clinical Psychology*.)

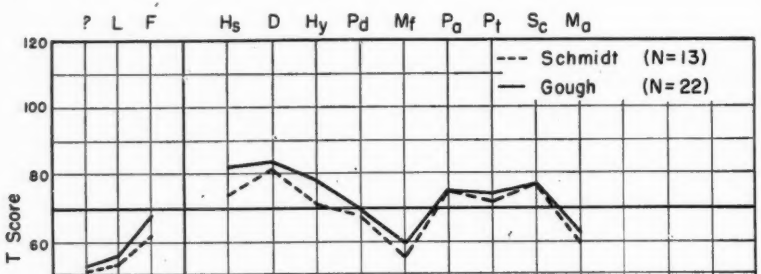

FIGURE 4.—*Mean Profiles without K for Psychotics as Shown by Gough* (82) *and Schmidt* (182). (Reproduced by permission of the authors and the journals.)

offenses listed as being AWOL, desertion, theft, assault, misuse of G.I. property, insubordination, lying, sexual promiscuity and alcoholism. The heterogeneity of the conduct disorders in this group may have operated to produce a general male conduct disorder profile at Pd and Ma. Guthrie (99) describes the mean profile for 25 cases with psychiatric diagnoses of psychopathic personality. He says they tend to have a distinct spike at Pd with secondary elevation on the Ma scale and sometimes on the Pa scale. He explains the rise

on Pa as a reaction to restriction of freedom. Capwell (39) states that the greatest differentiation between delinquent and non-delinquent girls was shown by the Pd and Pa scales. Alcoholics score high on Pd according to Manson (144). Harris and Ives (105), and Aaronson and Welsh (1) found that alcoholics followed the general neurotic structure but had a greater Pd score. Brown (25) reports a study of 80 chronic alcoholics. She states that these subjects can be divided into two groups, those with a neurotic profile with D elevated and those with a psychopathic profile with Pd elevated. Profiles by Schmidt and Gough are presented in Figure 5 and those of Brown are given in Figure 6.

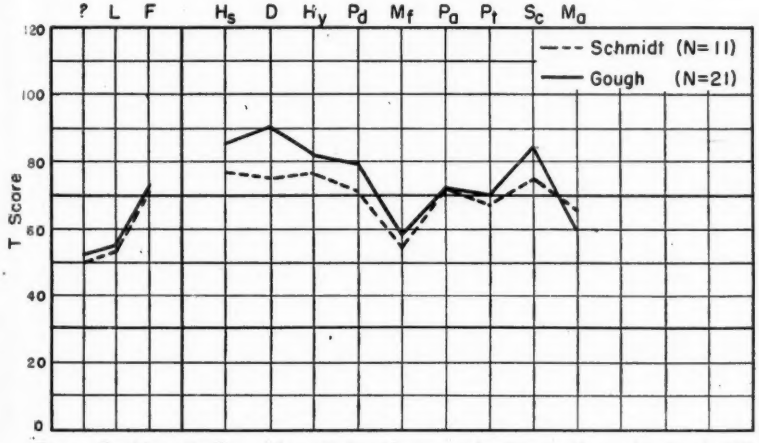

FIGURE 5.—*Mean Profiles without K for Character Disorders as Shown by Gough* (82) *and Schmidt* (182). (Reproduced by permission of the authors and the journals.)

Simon (189), and Simon and Hales (190) studied patients with clinically established suicidal preoccupation. They report that the pattern for the potential suicide has peaks at D and Pt.

Gough (92) points out that the combination of character scales K, Hy, Pd and Ma with symptom scales such as D complicate the problem of profile analysis. He says that in profile analysis three aspects of the pattern to be considered are slope of the curve for all scales, phases or peaks observed, and overall elevation. The neurotic triad higher than psychotic triad is negative slope found in neurotic groups. The psychotic triad higher than neurotic triad is positive slope. The slope is usually neutral or positive with psychotic groups. There are usually two peaks or phases to the profile centering about the two triads, except in character disorders. The overall elevation seems to indicate the seriousness of the abnormality.

FACTOR ANALYSES

Two factorial studies which include the MMPI lend support to the attempts at pattern definition mentioned above. Cottle (53) found two factors common to the MMPI and the Bell Adjustment Inventory. One of these was called "neu-

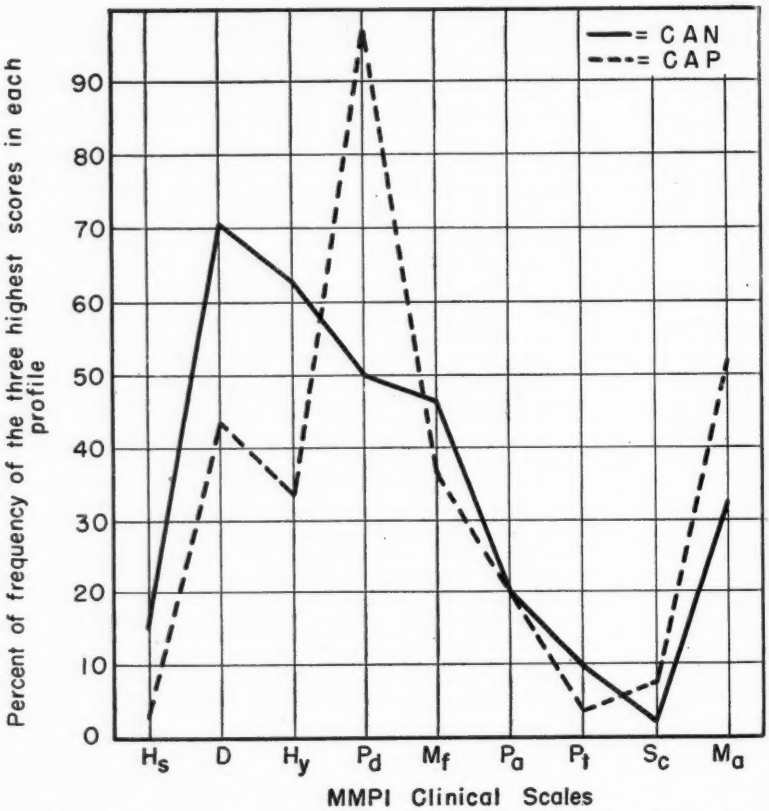

FIGURE 6.—*Percent of Frequency that Each Scale Was One of the Three Highest Scales in Each Individual Profile of 34 Chronic Alcoholic Neurotics (CAN) and 33 Chronic Alcoholic Psychopathic Cases* (CAP) (25). (Reprinted with permission of author and *Journal of Clinical Psychology.*)

rotic tendency" and had highest rotated loadings on the neurotic triad. The other was called "psychotic tendency" and had highest loadings on Sc, Pt, Ma, F and Pd. Cook and Wherry (49) found a factor with highest loadings on Sc, Pt, Hs, F, and Ma. They called this "tendency to personality maladjustment". It would appear to be comparable to the "psychotic tendency" found by Cottle.

These factors would appear to support the neurotic and psychotic patterns identified by profile analysis.

An interesting phenomenon is reported by Cottle and Powell (56) in a study of the effect of random answers to the MMPI using dice and tables of random numbers. They found that random answers rarely produce a profile within the normal range, that to secure scores representing normal adjustment there must

be the censoring and integrating effect of personality. They note also that answering all MMPI items false will produce a profile highest on the neurotic triad and answering all items true will produce a profile highest on the psychotic scales.

The logical projection of this study to an MMPI profile would be to consider that high scores on the neurotic triad result from a majority of false answers, while a majority of true answers produces high scores on the psychotic triad. Here then is an explanation of what happens when such patterns are noted, but not of *why* it happens. Why is it that so-called neurotic personalities answer MMPI items false and psychotics mark these items true? This study does emphasize that normal profiles are not a result of chance and may be the result of compensating traits which tend to cancel one another. Another interesting phenomenon is that the profile secured with dice and random numbers falls at the median of the items for each scale.

Comparing Profiles

An attempt to deal statistically with the problem of profile or pattern analysis has been made by DuMas (67, 68, 69, 70). He has developed a "coefficient of profile similarity". This would involve establishing mean profiles such as those of Schmidt, Gough, or Guthrie or typical profiles such as those described by Meehl. These profiles could be used as a reference to establish the similarity or dissimilarity of an individual MMPI, profile for pattern analysis **but do not allow for differences in height between profiles.** DuMas lists the steps in profile analysis as follows:

1. Plot the individual profile.
2. Select a reference profile and place a check mark where the same segments of the two profiles show similar slope. Place an X where they exhibit dissimilar slope and an O where either or both segments show zero slope.
3. Count check marks, this is **S.** Count X marks and add to check marks, this is *T*. ($\Sigma\surd = S$; $\Sigma\surd + \Sigma X = T$.)
4. Compute the coefficient of profile similarity by means of the formula $r_{ps} = 2(S/T - .50)$.
5. The standard error of $r_{ps} = \sqrt{1/T}$

This method permits testing each scale or, by summing S and T values for all scales, testing the null hypothesis for the instrument. DuMas (69) has published tables for r_{ps} and σr_{ps} in order to simplify this method. This meets two of the criteria suggested by Gough (92) namely slope and phasicality, but does not include the general elevation of the curve.

Perhaps it would be well to consider here the matter of statistics as applied to the MMPI profiles. A number of studies have applied present statistical techniques in MMPI research and conclude "although no statistically significant differences are found, inspection of profiles seems to indicate significant data." This is best illustrated by a study done by Rubin (174). He attempted to discover whether a significant F ratio could be found using analysis of variance techniques with four pathological groups: chronic alcoholics (N=8); psychopaths (N=24); schizophrenics (N=33); and psychoneurotics (N=28). He found a significant F ratio only for the question score and the Sc scale with the schizophrenic group and concludes "the MMPI was found to have little diagnostic value in a VA mental hospital". Aaronson and Welsh (1) had judges sort blindly the mean profiles published by Rubin into the four original categories. They state that the results of this experiment show that "the differentiations which Rubin asserts the MMPI does not make are present in

his published data". They make the additional statement that "personality on the Minnesota Multiphasic Personality Inventory must be read in terms of the particular pattern and not by the height of any given score (scale) taken by itself". Rubin (175) in his reply raises the question of the validity of pattern analysis of individual profiles inferred from study of group means.

In contrast to the research reported by Rubin, Guthrie (99) reports that an analysis of variance of the eight clinical scales (Mf and Si were omitted) using 89 cases divided into six groups produced F ratios significant at the one percent level for all scales. He also had seven competent judges sort the 89 profiles twice. He combined these sortings into a 6 x 6 contingency table and reports a contingency coefficient of .71 for both sortings. Guthrie suggests that the difference between his findings and those of Rubin may be a result of the finer discrimination secured by dividing psychotic and psychoneurotic categories into subgroups.

It is not intended here to participate in this controversy over the relative merits of statistical methods. It is used rather to illustrate several important points involved in the problem of pattern analysis of MMPI profiles. With the possible exception of DuMas's coefficient of profile similarity, present statistical techniques have generally proven inadequate in differentiation of MMPI scores. Rubin's analysis of variance did not show differences which obviously exist in pattern analysis of group means using his data. Some method of constructing typical reference profiles must be used either for DuMas's statistic or in the construction of cellulose acetate overlays for inspectional analysis. Gough, Schmidt, and Aaronson and Welsh have attempted the construction of such mean profiles from the scores of pathological groups. Meehl infers that this is the source of his descriptions of patterns. An added difficulty in this technique is the variation of mean scores of subgroups in each general pathological category.

The entire problem of differentiating abnormal from normal is based on difference from a normative group mean for each scale. It would seem that one has no choice but to begin pattern analysis by using some kind of mean scores which will be a reference point for identifying similarity or dissimilarity to a pathological group in terms of total profile of scores.

Summary

Attempts at profile analysis have identified four profiles: a psychoneurotic profile with neurotic triad highest, and Pt the highest scale in the psychotic triad; a psychotic profile with D the highest scale in the neurotic triad and Pa and/or Sc higher than Pt in the psychotic triad; a psychopathic profile with the neurotic triad, Mf, Pa, or Ma appearing variously in combination with Pd according to the type of conduct disorder, and, a potential suicide profile with peaks at D and Pt. Factorial studies offer some support for the first two profiles listed above. Gough suggests these criteria for pattern analysis: slope of curve for all scales, phases or peaks, and elevation of the curve.

There is some evidence that present statistical techniques are inadequate for analyzing scores on the MMPI, with the possible exception of DuMas's coefficient of profile similarity. Profiles of mean scores on cellulose acetate overlays may be an elementary step in profile analysis of the MMPI.

Chapter 5
ADAPTATIONS

Card Form

The original form of the MMPI consisted of 504 items printed individually on cards and in an appropriate box container. The person taking the inventory sorts these cards into sections of the box marked *true, false,* or *cannot say.* The number of items was later increased to a total of 550. One side of the pack of cards is stained in color in order to provide a rapid check for reversals or inversions. The inventory is published also in a booklet form with an IBM answer sheet for group administration.

In the card form a record of significant items in the *true* pack is accomplished by separation according to cuts on the two opposite corners of the cards. The significant *true* items are those cut on the lower right hand corner. These are recorded with a red X in the proper cell of the record blank. The same procedure is followed for the *false* items which have the significant answers cut on the lower lefthand corners. The last step in recording is to enter the *cannot say* items as black question marks in the appropriate cell of the record blank. The packs are then shuffled by intermixing and the cards are returned to the box ready for the next person to take the test.

Scoring Methods

The card form of the inventory is scored by placing transparent templates over the record blank. The scores are secured in the order they appear on the individual profile. The score for the L scale is the number of red X's in the last 15 items of the record blank (J41-J55). Most of the scales are scored by counting one point for every item having a red X on the record sheet beside an X on the key. Some of the keys have zeros as well as X's. These score as one point when the blank cell on the record sheet corresponds to a zero on the scoring template.

These raw scores are translated into T scores by using the manuals (115, 107). Except for ?, L and F scores these scores are standard scores where the mean of the norm groups is 50 and 10 T score points is equal to one adjusted standard deviation. T scores above 70 are considered abnormal, while little is known about the meaning of those below average. Most of the factorial studies of personality indicate that each scale may be measuring a dichotomy of opposite traits. Empirical evidence from counseling seems to support this so that a hypothesis might be presented that intensification in the direction of low score may mean the opposite of abnormally high scores. Adolescents and the lower levels of intelligence tend to get lower scores also, so that there may be no single explanation for abnormally low scores.

Length of time required for scoring the card form has produced a number of short methods. Burton and Bright (36) have adapted the MMPI to group administration and rapid scoring by constructing decks of especially designed IBM punch cards. A numeric code is assigned each item. Complete posting and tabulating takes 21 minutes. This can be cut to 12 minutes with skeletonized routine IBM tabulation. Ferguson (76) reports that reducing the card form by removing 200 items not scored causes no appreciable difference in profile. He punched the

cards and coded them for drop sorting to reduce scoring time. A method of notching each card for the scale in which it is counted is given by Krise (135). Manson and Grayson (145) developed a keysort method of scoring MMPI cards in four needle movements. They divide the *true* and the *false* packs into deviate and non-deviate piles and then subdivide these into X-O deviate items. Schneidman (188) gives a scoring method carried out by punching the cards. He outlines seven steps requiring ten minutes scoring time which are similar to the keysort method.

Other shortened methods of scoring the card form include one by Gulde and Roy (98) which is claimed to require only four minutes. This method provides only total scores and does not permit identifying single responses. Drake (65) has developed a method for machine scoring the card form in 15 to 20 minutes. He outlines six steps to be used in transferring answers from cards to a 600 item true-false machine answer sheet. Davis (62) has developed a method of scoring by numbering backs of cards and sorting into piles. Count of cards in each pile is the score for a specific scale. Davis claims that his system cuts time of scoring by one-half. Mullen (162) has extended Davis's scoring system to include K scale corrections. This slows the process, but greater efficiency in checking scores is achieved.

Corsini (51) reports a time and motion study which shows that a skilled clerk can score four or five boxes per hour with acceptable accuracy. He concludes that "in clinics where a relatively small number of MMPI tests are given, there would appear to be no advantage to use of the more elaborate short-cut methods".

Thus it seems that there is no appreciable advantage to the short cut methods for the scoring of small numbers of MMPI tests. If large numbers of tests need to be scored, a short-cut method could be used or the booklet form of the test could be administered and machine-scored.

Booklet Form

Although the card form of the MMPI is strongly recommended for individual administration, a booklet form has been developed to permit group administration. For ease in scoring, 16 items have been duplicated in the booklet form to make a total of 566 items. The booklet form has a machine-scored answer sheet and two sets of scoring stencils. Green stencils are used in hand-scoring the booklet form and blue stencils permit scoring with an IBM test scoring machine. Complete directions for machine scoring are found in the supplementary manual (107).

In addition to its adaptability to group administration the booklet form produces fewer items in the *cannot say* category (54).

Shortened Form

It is possible to use a shortened form of the MMPI by eliminating all items beyond number 366 in the booklet form except items numbered 374, 383, 397, 398, 406, 461, and 502. These latter items are counted in scoring the K scale. In group administration of the shortened form instruction should be given to draw a line through the number of item 367 and circle the numbers of the seven items to be answered after number 367. Care should be taken that this does not mark the answers to these items. This permits scoring on the 13 original scales including K, but does not allow for scoring on any new scales, such as Si. Use of the

shortened form permits completion of the test within one hour in most cases. The disadvantage to the use of a shortened form of the test, either card form or booklet, is that **such tests can only be scored for the nine original scales.** They cannot be scored for many of the new scales which have been developed recently. Twenty-four of the 70 items on the Si scale would be omitted under this system.

Braille Edition

Cross (59) has developed a Braille edition of the MMPI for use with the blind. These cards are printed in grade one and one-half Braille and are sorted into piles by the person taking the test instead of being sorted into the box. Cross cites Brown's report (24) that the blind are more neurotic than sighted individuals. Although his sample is small (25 males and 25 females aged 16 and up), he disagrees with Brown and claims that the blind are relatively normal. Cross identified 20 items on which the blind differ significantly from a sighted group in their answers.

Coding Methods

Hathaway (108) has proposed a coding system for MMPI profiles. He proposes that this code number represent the high and low scales for the profile and be placed in the upper left hand corner of a 3x5 card containing identifying personal data. The clinical scales are numbered 1 through 9. Then the profile might be expressed by the code 32'*17*-69 which means Hy and D scores are above 70 with Hy the highest, Hs and Pt between 70 and 54, and Pa and Ma below 46. The use of italics in the case of Hs and Pt idicates the scores for these scales are about the same. Numbers of scales with T scores of 46 to 54 inclusive are omitted. If the T score value of ? or L equals or exceeds 70, or that for F equals or exceeds 80, an X is placed after the code to indicate probable invalidity of the profile. Hathaway also includes a system for filing these cards with reference to the numbers at the left of the dash.

Hathaway states that this system of coding should meet the suggestions of DuMas (68) about the need for expression of intensity and pattern in profile analysis.

Welsh (203) has proposed an extension of Hathaway's coding system to include indices of the height of each scale using the following symbols: a T score of 90 or more, star (*); 80 to 89, double prime (″); 70 to 79, prime (′); 60 to 69, dash (—); 50 to 59, diagonal (/); 40 to 49, colon (:); and, 30 to 39, number (#). For example, 1*23/6: would mean an Hs score of 90 or more, D and Hy between 50 and 59, and Pa between 40 and 49.

In another article Welsh (204) has suggested that this system has a number of advantages when used in a clinic. It is useful for filing data and in locating research data. It is easy to describe profiles in code in a clinical situation or to transfer scores by phone. It is easy to see the relationship of one profile to another when their codes are compared. Welsh illustrates this with codes for successive administrations of the MMPI with a single case as described by Andersen (12). This article by Welsh also suggests that the code for the clinical scales be followed by the validating scale symbols (?, L, F, K) and the same system of coding used to show the height of these scales.

Chapter 6

USE IN CLINICAL PSYCHOLOGY AND MEDICINE

The research reports included in this chapter deal primarily with studies of a clinical nature. They do not include some clinical studies which have been reported sufficiently in preceding chapters. The MMPI studies reported here seem to fall in five main classifications: general use in clinical psychology and medicine, experimental use, use in therapy, use with certain physiological states and use pertaining to character disorders.

General Use

The first report on the general use of the MMPI under clinical conditions other than reports by the authors of the test is that of Leverenz (138). Leverenz states that he found the MMPI useful in dealing with 700 cases in the psychiatric service of a station hospital. He lists three values attached to the MMPI: it gives direction to inquiry in evaluating psychiatric disorders, assistance in categorizing personality disturbance and gauging severity of the case; it helps in evaluating borderline conditions and mixtures of psychiatric syndromes; and it is valuable diagnostically and prognostically for men subject to dismissal from the armed forces for personality disorders.

In this report Leverenz includes median scores for 54 normals and 105 surgical cases which are considered normal. He gives median scores for diagnoses of hypochondriasis, depression and psychosis. The median scores for hypochondriasis were: Hs, 83; D, 72; Hy, 78, with other scores within the normal range. Median scores for depression cases show: D, 81; Hs, 67; Hy, 66, and Pt, 65, while median scores for psychosis are Sc, 79; D, 77; Pt, 74; Pa, 66, and Hy, 65. Subjects with homosexual behavior invariably had a high score on the Mf scale. He found the inventory most useful for psychoneurotic patients having hypochondriasis as the most prominent syndrome.

The profiles of 47 cases of men with peptic ulcer are discussed. Leverenz claims that ulcer patients with normal scores showed the most rapid improvement. Conversely those who had elevated scores on the neurotic triad showed the least improvement clinically.

Leverenz points out that although persons with neurotic or psychotic conditions occasionally obtained normal scores, it was rare to observe an abnormal curve for a person when the abnormality could not be disclosed by conventional psychiatric observation. This may be a function of the selectivity of the population reported by Leverenz.

Michael and Buhler (156) report the use of the MMPI with 88 males and 83 females in a neuropsychiatric department of a public general hospital. **The MMPI was only given to clarify diagnosis in a complex case.** They state that while there were many unclear results in which the interpretation of the curve remained doubtful, successful MMPI diagnosis was made in 45 percent of the cases. Considering the restrictions placed upon the use of the MMPI, this percentage is quite favorable.

Michael and Buhler present six illustrative cases and they claim they found the test useful for the following purposes: to give objective evidence and supplementary information in problematic cases, to help clarify the psychological struc-

ture of the case, and in some cases to bring forth new material or suggest a new emphasis. Advantages of the MMPI are listed as ease of administration and scoring, objectivity of results and the clarified clinical definition. Disadvantages are listed as the limited range of successful diagnosis, lack of reliability of discrimination between psychosis and psychoneurosis, and the limited clinical definition which does not indicate structure as found in the Rorschach.

Modlin (158) used 100 normals as a control group and 316 psychiatric patients as an experimental group to investigate the potentialities of the MMPI. He concludes that it is a valuable psychometric instrument most useful through combinations of multiple scores, but warns that it must be interpreted in terms of the total clinical picture. It is not a substitute for a psychiatrist.

Modlin suggests averaging the scores in the neurotic triad to secure an 'anxiety' score. He claims that the MMPI elicits significant data in cases of migraine, post-traumatic headache, epilepsy, somnambulism and enuresis. He says that retests prove dependable in following the clinical course of a case and in determining prognosis.

Kamman (132) finds the MMPI useful for psychosomatic diagnosis in evaluating borderline conditions where emphasis may be more psychic or more somatic and for evaluating mixtures of psychotic and psychoneurotic elements. He says that the MMPI is not as sensitive as the Rorschach, but that use of the test requires less training. (This latter statement is a rather common fallacy pertaining to the MMPI. **Competent clinical use requires fully as much training as any other evaluative device.)**

Wauck (202) investigated 80 clinically diagnosed schizophrenic patients at Chicago State Hospital whose average age was 32 and who ranged in age from 15 to 53. The individual form of the MMPI was used. In 41 percent of the cases Sc was 70 or above and in 22 percent Sc was the highest score. In 37 percent of the cases Pa was 70 or above and in 12 percent Pa was the highest score. In 28 percent of the cases Pt was 70 or above and in 2.5 percent of the cases Pt was the highest score. No significant sex differences were noted, but an age factor was found. When divided by age into three groups of age 15-29, 30-39, and 40-53, there was a tendency for older groups to secure lower scores. The most elevated scores were secured by the 15-29 year old group (See Figure 4, Chapter 4.). An item analysis revealed little consistency in Sc items for the total group or the sub-groups. A sub-group of 31 diagnosed paranoids showed approximately the same profile as the total group.

Hovey (121) reports 199 psychiatric cases classified as 105 somatization reaction patients, 34 dissociative-conversion reaction patients and 60 anxiety reaction patients. Composite MMPI profiles are shown for each group. The MMPI scores indicated that the first two groups were more nearly alike. The first group was deviate on the Hs scale and near-deviate on D and Hy. The dissociative-conversion group was deviate on Hs and Hy, and near-deviate on D, with K most elevated of the three groups. The anxiety reaction group was deviate on D, Hs, Pt, Sc and Hy and near-deviate on all other scales. This last group was lowest of the groups on the K scale and highest on the F scale.

Miller (157) investigated levels of aspiration of hysterics and neurasthenics using a criterion of clinical diagnosis and Rorschach or MMPI scores to classify patients as conversion hysteria, vegetative neurosis, mixed cases, ward controls or normal controls. Conversion hysteria patients had a negative aspiration level.

The average level of aspiration of the vegetative neurosis group was highest of all groups. Miller reports a significant tendency for negative aspiration level to be associated with children having no siblings.

Benton and Probst (16) compared ratings of four psychiatrists with MMPI scores for 70 cases. They found a significant difference between normals and abnormals for Pd, Pa and Sc. They claim that the MMPI yields too many false positives on Hs and D. T-score means and standard deviations are given for each group on the MMPI scales.

Benton (15) gave the MMPI to 85 patients who had been diagnosed as follows: schizophrenia, 10 cases; conversion hysteria, 9 cases; delinquency, 16 cases; homosexuals, 10 cases; diabetes mellitus, 17 cases; and, cardio-vascular disease, 23 cases. Ages ranged from 17 to 60 with median age of 21 years. He considered validity positive if trend in question was a T-score of 70 or if a T-score of 65 to 69 was the highest of the clinical scales. Organic cases were considered psychoneurotic if either Hs or Hy met the conditions outlined in the previous sentence. Benton reports that five of the schizophrenia cases were positive; five of the hysteria cases were positive; 13 of the delinquency cases were positive on Pd, and nine homosexuals were positive on Mf. When homosexuals were retested with instructions to secure a normal score, six out of nine were able to do so. Only two of the 17 diabetics were positive on Hs or Hy and 13 of the 23 heart cases were positive on Hs or Hy. Benton concludes that the MMPI is reasonably accurate in identifying delinquents and homosexuals, but less satisfactory for schizophrenics and hysteria cases. He suggests further investigation of organic disorders with the MMPI.

Walch and Schneider (201) report favorably on the use of the MMPI in clinical practice. They recommend it to the physician to supplement his diagnosis. Seven case histories are presented.

Rosenzweig (173) discusses one case of amnesic personality measured with a variety of tests. The MMPI yielded a completely normal profile, but supported a clinical impression of evasiveness in the subject.

On the whole the reports of clinical research are favorable to the use of the MMPI in identification or clarification of diagnosis for pathological groups. Benton found it most useful with psychoneurotic patients having a prominent symptom of hypochondriasis and for prognosis with peptic ulcer patients. Michael and Buhler report some success in use of the MMPI to clarify diagnosis in complex cases. Modlin finds it valuable, particularly in combinations of multiple scores. Kamman suggests its use in clarifying diagnoses having mixed psychic and somatic symptoms. Wauck found that younger schizophrenic patients tended to secure more markedly abnormal scores. Miller notes that the MMPI is useful in a multiple criterion to classify experimental groups. Benton and Probst claim the MMPI yields too many false positives on Hs and D. Benton found it more useful with character disorders than with hysteria or schizophrenia cases. Walch and Schneider recommend it to the physician to supplement diagnosis.

Leverenz and Benton present evidence that the MMPI may be useful to investigate or describe organic disorders.

Experimental Use

The major use of the MMPI in experimental studies is contained in the Minnesota nutritional studies.

Brozek and others (30) report the use of the MMPI in an exploration of the effects of restricted intake of vitamins of the B complex. They used as subjects eight volunteer conscientious objectors who were young men free from history of or evidenced abnormality. The MMPI was given six times during the experiment. After 22 days of acute deficiency the unsupplemented group obtained strikingly high scores. This effect was most clear on the neurotic triad. An item analysis showed that significant items for this group were about one-half physical complaints and one-half complaints of a psychological nature. The trend of MMPI scores agreed closely with self-rating and man-by-man ratings. There was no noticeable change of personality status during partial restriction, but important changes occurred in the period of acute deficiency. The D scale was the most prominent.

Guetzkow and others (97) report on personality changes in experimental semi-starvation and rehabilitation for 32 men. They state that personality changes during semi-starvation present a picture of neurasthenia with chief symptoms being weakness, easy fatiguability, depression and a sense of ageing. Scores on the psychoneurotic scales of the MMPI rose markedly. The mean score on the Hs scale increased from 54.7 to 63.0, that of the D scale from 54.2 to 73.4 and the Hy scale increased from 59.0 to 70.0. After twelve weeks of rehabilitation the mean scores were 54.1, 65.7 and 64.9, respectively. There are indications that interests contracted and the sexual urge decreased during semi-starvation.

Brozek and Erickson (32) report on an item analysis of the neurotic triad in experimental starvation. The Hs, D and Hy scales were separated into somatic, psychic, corrective and subtle items. The significant items contained 48 percent somatic, 32 percent psychic and only 20 percent for the other classes. The somatic items contributed most to the elevation of the Hy scale. Fifty percent of the significant items on the D scale were psychic items. The percentage frequencies of items were similar to those contributing to the elevation of scores of neurotic patients who had no physical pathology. Brozek and Erickson state that since there were no fundamental differences between the kind of answers given by semi-starved subjects and those given by patients with a clinical diagnosis of psychoneurosis, this temporary personality disturbance in semi-starvation may be described as a mild psychoneurosis.

A further description of the effect of semi-starvation on the F scale of the MMPI is presented by Brozek and Schiele (31). They state that there was a negligible change on the F scale while the neurotic triad rose markedly. Only in those cases where the psychotic triad rose did F rise markedly. The rest of the profile was valid and substantiated clinically in the presence of high F score. They report in detail six cases with critical F responses.

Schiele and Brozek (181) present further data on the semi-starvation studies which were roughly divided into three months of good diet, six months of semi-starvation and three months of controlled nutritional rehabilitation. The chief psychological manifestations were intense preoccupation with thoughts of food, emotional change toward irritability and depression, decrease of self-initiated activity, loss of sexual drive and social introversion.

Schiele and Brozek report varying changes of the MMPI scales throughout the experiment. The scores on L and F scales remained normal and there was little change on the Pd scale. The neurotic triad was elevated during the semi-starvation and there was moderate elevation on the Pa, Pt, Sc and Ma scales. Although

the Mf scale was elevated throughout the experiment because of the sample, Schiele and Brozek state that "the slight drop (in Mf) is consistent with a clinical impression that the Mf tends to go down as neurotic reactions develop". Behavioral changes often represented useful or necessary adjustments. Ten case studies are presented in detail with successive MMPI profiles for each subject at various stages of the experiment.

Birnberg (20) investigated the relationship between a food aversion checklist and MMPI scores for 110 white college women. Little relationship appeared except for a coefficient of .16 between the Sc scale and the checklist score.

Sweetland (196) used the MMPI with fourteen male and one female college student to investigate the effect of hypnosis on various psychological states. When the MMPI was given the first time all students secured normal scores. Then each student was hypnotized and told to take the MMPI simulating depression, hypochondriasis and inverted depression. The attempt to produce a hypnotic neurosis of hypochondriasis was satisfactory, but the depressive states were identifiable with an index of F minus K, and by Pd scores in some cases, Sweetland claims that the hypnotic neurosis is not a simulated state or a test-taking attitude. However, Gough (91) points out that while the hypnotic neurosis may be relatively undetectable on the MMPI, "few of the subjects seen by clinical workers will be presenting themselves in trance states".

Brower (28) studied the relationship between cardio-vascular measures and MMPI scores before and after visuo-motor conflict. Subjects in the experiment were 23 female and 25 male college students. Brower claims that the experience of visuo-motor conflict creates sufficient disruptive circumstances to sever relationship between cardio-vascular activities and personality factors. The Hs score and experimental pulse rate produce a tetrachoric coefficient of .97. Those showing high pulse rate before the experiment also show tendency to higher Hs score.

In another article dealing with this topic Brower (29) reports that higher scores on Hs and Hy produce a tendency toward greater accuracy and neurotic individuals tend to perform better on a maze-coordination test. There is an underlying correlation between efficiency of performance under visuo-motor conflict and egocentric tendencies or preoccupation with self.

Zwerling (215) used the MMPI to study susceptibility to motion sickness. Electric shock applied during rotation in a Spiegel chair caused greater incidence of motion sickness. There was a statistically non-significant, but consistent relationship between neurotic tendency as measured by the MMPI and susceptibility to motion sickness. Fear or anxiety heightens this susceptibility. Zwerling states that 12 items showed a significant difference in response by very susceptible and non-susceptible subjects.

The major experimental use of the MMPI has been in the Minnesota nutritional studies. They have indicated that the neurotic triad rises markedly under conditions of vitamin B deficiencies and semi-starvation. This is accompanied by weakness, easy fatiguability, depression, narrowing of interests and a decreased sex urge. Both psychic and somatic items of the MMPI are affected by this nutritional psychoneurosis.

Other experimental findings are as follows: There would appear to be little relationship between food aversions and MMPI answers. It is possible to induce a state of hypochondriasis by hypnosis. Visuo-motor conflict reduces the relationship between personality factors and cardio-vascular activities. Higher scores in

the neurotic triad are related to a tendency toward greater accuracy and better performance in a maze-coordination test. Neurotic tendency is related to susceptibility to motion sickness.

It will be noted that all of these results pertain to relationships on the neurotic triad. These three scales of the MMPI would appear to be the most sensitive to physiological change and seem to be worth including in any studies of physiological status.

Therapy

Use of the MMPI to measure effects of various therapies is reported here. Feldman (75) attempted to produce a scale of MMPI items to select patients who might respond successfully to shock therapy. By means of item analysis 42 items were identified. When applied to two groups of 22 improved and unimproved patients these items differentiated between the groups at better than the one percent level. However, overlap was too great for individual prediction.

Hales and Simon (100) studied MMPI patterns before and after insulin shock therapy was administered to 20 diagnosed schizophrenic patients. Half of these patients showed improvement. Pre-therapy profiles of the improved group showed lower scores on the K scale and higher scores on Mf, Pa, Pt and Sc than for the unimproved group. After therapy K increased and there were decreases on F, Pa and Sc for the improved group. There was a tendency for scores of the unimproved group to increase after therapy. Two individual profiles and three group profiles are given.

Pearson (168) reports on the MMPI as a predictor of response of schizophrenic patients to electro-convulsive therapy. He investigated scores of 29 white male veterans on the MMPI given within seven days of the first EST treatment. Poor response to therapy was characterized by a T score on the D scale greater than 84 or less than 55, a T score on the Sc scale greater than 84 and four or more of the nine clinical scales with a T score of 80 or higher. These three variables differentiated well beyond chance expectancy ($p<.01$). The combination of these predictors was validated by psychiatric judgment in 44 percent of cases with no overlap.

Schofield (186,187) attempted detection and measurement of therapy-induced changes in personality of female subjects by status-score and item response change. His 124 subjects were classified as follows: normals, 42; outpatients (mixed psychoneurotic), 25; hospitalized neurotics, 24; hospitalized psychotics not treated with shock therapy, 13; and hospitalized psychotics given electro-shock therapy, 20. Subjects receiving electro-shock treatment showed significant decrease on all scales except Mf and Ma. Greatest change for this group was on D, Pd, Pt and Sc. Hospitalized neurotics showed significant decrease on Hs, Hy and Pd scales in contrast to the outpatient group with similar initial mean profile which showed little change following treatment. All clinical groups changed response more than normals. Schofield suggests a "stability-of-response continuum of normals to neurotics to psychotics with the last group showing the most change". The most stable items tended to be concentrated on the F and Sc scales. They tended to be obvious in nature, to involve no estimate of frequency of occurrence and to be more often stated in the past tense. Variable items tended to be scattered among the scales, to be subtle, to involve an estimate of frequency and to be stated in the present tense. The changed responses of clinical groups include a

significantly greater concentration of scored items. Schofield claims that this shows the sensitivity of the MMPI to therapy-induced changes in personality.

Schofield attempted to develop a scale to predict favorable response to therapy. Twenty-four items for this Px scale are reported (187:25). Although the mean Px score was significantly lower after therapy, there was too much overlap to make the scale useful for individual prediction.

Pacella and others (166) investigated the effects of elctro-convulsive therapy on certain personality traits. They tried to identify cases by using a single scale. When they used a cut score of 70 on the Sc scale they were only able to identify 20 out of 40 cases and had nine false positives. When they used only the D scale the MMPI was even less useful in diagnosing manic-depressives. Therefore they feel that the MMPI is useless as a prognostic aid except when used one week after treatment to determine whether the improved patient would retain improvement. This study again indicates the weakness of trying to use a single scale of the MMPI instead of using patterns of scores. These results are a direct product of the design of the experiment. The article contains good profiles of affective disorders, but they are poorly labelled.

In contrast to the above study are research reports of Harris, and Harris and others. Harris (103) made a study of the diagnostic and prognostic efficiency of the MMPI with convulsive therapy patients. It is claimed that patterns of scores (**not single scales**) do differentiate diagnostic and prognostic groups. Diagnostic patterns follow names of the original scales. Poor prognosis is associated with a clinical diagnosis of schizophrenia or severe psychoneurosis and a pattern of high scores on the psychotic triad. Harris and others (106) studied the effect of electro-narcosis therapy with the MMPI. They selected long duration patients for electro-narcosis therapy who were classified as schizophrenic, manic-depressive and psychoneurotic. They found absence of high D score was associated with poor prognosis. Their group tended to be highest on D, Sc, Pa and Pt. In insulin or electro-shock treatment those rated much improved or recovered tended to score high only on the D scale and to have psychomotor retardation, while those rated "unimproved" or "slight improvement" had higher scores on psychotic or psychopathic scales. They state that patients who are primarily depressed respond best; those with high D and Sc scores show attenuation of symptom severity; and, patients who score within the normal range of the MMPI (without overt symptomatology) remain unchanged.

Harris and others say, "The character of the symptoms and the kind of personality, as revealed by the Multiphasic, are closely related to prognosis, and unless there is an affective disturbance (high D), prognosis is relatively poor. This generalization holds, regardless of the type of therapy" (106: 374).

They state also, "A secondary implication of the findings, suggested by the similarity of the criteria for poor response to the convulsive therapies (psychotics) and to psychotherapy (neurotics), is that the Multiphasic can identify relatively unmodifiable aspects of mental disorder and that these aspects cut across the traditional separation of the psychoses from the neuroses (106:375-6). We have used this test successfully in making predictions of the outcome of therapy with other groups of patients treated with other kinds of therapy (106:372)."

Harris and Christiansen (104) discuss the response to brief psychotherapy of 53 patients with delayed recovery from physical disease or injury. They state that the prognostically favorable group have peaks on Hs, D and Hy with a

secondary peak on Pt. This is found frequently in neuropsychiatric cases with physical symptoms, chronic head injuries and a delayed total recovery group. Both the MMPI and the Rorschach reveal subclinical psychotic trends suggesting a "distortion of reality" in the poor prognostic group.

Rashkis and Shaskan (170) report the use of the MMPI to measure the effect of group psychotherapy. The test was given to 22 patients at beginning and end of treatment which varied between two and seven weeks according to the patient. Only patients with a favorable prognosis were selected for therapy. Rashkis and Shaskan state that there was a definite reduction of scores on D, Hy, Pa and Pt. There were fewer reductions on Hs, Mf and Sc. There was no reduction on Pd and Ma was increased.

Wiener and Phillips (212) followed the course of a subject under psychoanalytic treatment with repeated administrations of the MMPI. An analysis of profiles is compared to the subject's own report of progress. This comparison made after eight months of treatment for one hour per week shows similarity on major factors of original severe anxiety state, alleviation of superficial symptoms and the present unresolved status of basic problems.

Hathaway and Harmon (109) present two case histories along with MMPI scores which support the clinical diagnosis.

Attempts to develop a scale for prognosis of therapy have not been successful because of overlap between successful and unsuccessful cases. Pre-therapy profiles of successful cases show a tendency to lower K score and high D score. Post-therapy profiles of these cases show an increase on K and a decrease on F, D and the psychotic triad. Clinical groups change more significant responses in retests than do normals. Repeated administrations of the MMPI reflect therapy-induced changes. Attempts to identify or predict therapy outcome by use of a single scale were not successful, but patterns of scores did differentiate diagnostic and prognostic groups. Prognosis for delayed recovery from physical disease or injury is best with primary peaks in the neurotic triad and secondary peak at Pt, while subclinical psychotic trends characterize poor prognosis with these cases.

Use with Physiological Conditions

Reports of use of the MMPI in the study of organic conditions as suggested above by Leverenz and Benton have been sporadic and relatively disconnected.

The MMPI was given to 110 male and 155 female patients in a tuberculosis sanatorium by Page (167) who matched them with normal controls on age, marital status and estimated intelligence. Fifty males and 50 females from hospital wards were matched with the experimental group on age and used as a supplemental control group. There were no differences between tubercular males and normal males on the validating scales. Tubercular males were significantly higher on the neurotic triad with an average T score of 60 and on the psychotic triad with an average T score of 55. Tubercular females were significantly higher than normal females on ?, Pd and Pa scales and on the neurotic triad. The hospital control patients show a similar pattern to the tubercular patients, but not as high. Page found no evidence to support hypotheses in the literature about personality factors of tubercular patients.

Ruesch and Bowman (179) used the MMPI to study prolonged post-traumatic syndromes following head injury in 188 cases. They derived neurotic and psychotic scores for comparative purposes by adding the three scores in each triad.

Groups compared were brain disease, N = 20; acute head injury, N = 51; chronic head injury without neurological signs, N = 60; chronic head injury with neurological signs, N = 57; and, psychoneurotics, N = 37. They report that cases of chronic head injury resemble psychoneurotics much more than do cases with brain disease. A common feature of late post-traumatic syndromes was abnormally high score on the neurotic triad and the large number of diffuse complaints. Additional conclusions were that the MMPI results largely agreed with clinical impressions and that the test constitutes an efficient screening device.

Ruesch (176) reports on MMPI results in the study of psychophysiological relations of 102 cases with head injuries. Neurotic and psychotic scores were derived as outlined above. Ruesch compared Wechsler-Bellevue I.Q. and neurotic scores and discovered a continuum ranging from psychoneurosis through chronic head injury and acute head injury to brain disease cases. He states that "there exists . . . . a mutually exclusive antagonism between presence of brain damage and psychoneurotic development". Late post-traumatic syndromes without signs of persistent brain damage resemble psychoneuroses on the neurotic triad scores. Chronic head injury with neurological signs and acute head injuries score closer to general population on the MMPI. A common factor to all head injuries and in psychoneurosis is insufficient rise in heart rate during periods of strain. The MMPI characteristics of the various groups studied by Ruesch are as follows: brain disease, diffuse, affecting majority of the scales; acute head injury has only abnormal score at D with the lowest neurotic and psychotic score of all groups; and, chronic head injury shows an increase on the neurotic triad.

Ruesch and others (178) used the MMPI to study 43 hyperthyroid patients where the clinical diagnosis was verified by removal of 32 toxic and 11 nontoxic goiters. Thirty-five of these patients were female and eight were male. Female patients tended to score highest on the Hy scale and males on the D scale. Severe psychopathology was not represented. Patients with normal recovery had undifferentiated normal MMPI profiles and higher intelligence test scores. Delayed recovery patients had abnormal MMPI profiles characterized by higher scores on the neurotic triad, Pd and Pt. The group divides into normal versus hysterical or anxiety types for women and into normal versus dependent personalities in men.

Andersen and Hanvik (13) report on differential effect of 16 cases of frontal and 27 cases of parietal brain lesions on the MMPI. They show mean scores for each group. Those patients having lesions of a frontal lobe had significantly higher K score. Those with parietal lobe lesions had significantly higher score on the Hs, D, Pt and Si scales. Andersen and Hanvik indicate that the frontal lobe group have "both psychometric and clinical indications characteristic of the hysteroid type of reaction pattern". They resemble Hovey's profile for dissociative-conversion reaction patients (121). The group with frontal lesions has the highest peak on the neurotic triad with the D scale the highest single score and a secondary peak on the Sc scale. The group having parietal lesions most clearly resembled patients suffering with anxiety neurosis. This group has the D scale lowest in the neurotic triad and a secondary peak at Pt.

Andersen (12) presents T scores for one pre-operative and five post-operative administrations of the MMPI for a single case where prefrontal lobotomy was performed in treatment of severe psychoneuroses. (This pre-operative pattern corresponds to the psychotic patterns of Gough and Meehl.) Andersen claims

that the post-operative MMPI series show a progressive change from a typically schizophrenic profile toward a typically psychopathic profile. That is, the Pd scale rises, the psychotic scales drop and the neurotic scales remain relatively low. He says that this faithfully reflects clinically observed personality changes. However, Welsh (204) points out that when these successive profiles are coded according to the system he proposes (Chapter 5), the basic personality structure as revealed by the MMPI remains essentially the same. Welsh says "This does not support the author's (Andersen's) contention that there was 'a progressive change from a typically schizophrenic profile through a typically psychopathic profile'. D, Sc, Pt and Pd occupy the first four positions in all the codes and Ma is the last scale in all but one of the codes . . . . Thus, although there is a trend for Pd to rise in the last three profiles, the profiles are by no means typically psychopathic."

Allerhand and others (5) have developed a preliminary scale for identifying neurodermatitis patients. This needs further research.

A study of twenty epileptics compared with the same number of normals and paraplegics matched on age, I.Q., sex and military service is reported by Francey (78). An item analysis of the MMPI scores was performed in an attempt to determine an 'epileptic' pattern. Thirty-one items differentiated epileptics from other groups. These results seem to indicate that there is a tendency toward withdrawal and feelings of inferiority among epileptics.

Wiener (209) presents MMPI mean scores and standard deviations for 100 normals and various VA disability groups. These disability groups are as follows: arthritis, 50 cases; asthma, 50 cases; gunshot wounds, 100 cases; malaria, 100 cases, and, duodenal ulcer, 50 cases. The arthritis group is highest on Hs and Hy with a secondary peak at Pt. The asthma group shows a tendency to high scores on Hs, Hy, Pd and Ma, with lower Mf score. The gunshot disability is characterized by higher scores on Hs, D and Ma. The malaria group is lower than the normal group on Pd and Mf. The ulcer group has higher scores on Hs and D and lower scores on Pd, Mf and Pa. A certain similarity is noted here to the results of the Minnesota nutritional studies reported earlier in this chapter, namely a tendency toward higher scores on the neurotic triad and a decrease on the interest scale (Mf). This may be characteristic of disease and deficiency groups. This conclusion is supported by data presented by Phillips and Weiner (169). They present data for eight VA disability groups and conclude that a relationship exists between disability, disease and personality as measured by the MMPI.

There appears to be a general tendency for abnormal physiological conditions to produce a rise in an individual's score on the neurotic triad of the MMPI, particularly on the Hs scale. It seems possible to develop mean profiles characterizing various groups. The mean profile for females tends to follow a different pattern for each group than those of males. Higher scores on the neurotic triad may indicate poor prognosis and a tendency to delayed recovery from injury or illness. The MMPI reflects to some extent clinically observed changes.

Use Pertaining to Character Disorders

In addition to the study of prefrontal lobotomy by Andersen reported above, the following studies associated with character disorders seem worthy of note.

Abramson reports two experiments with the effect of alcohol on the MMPI profiles of adults. In one study (2) he gave the MMPI to 20 adults, then three

weeks later they took it again after ingesting three ounces of whiskey rapidly between 4:30 and 5:00 p.m. The alcohol produced mild euphoria, talkativeness and slight unsteadiness. The time required to take the test was usually shorter for the second administration. The items contributing to the raw score were appreciably different after alcohol, but the nature of the profile was unchanged except to be depressed to a general lower level following alcohol ingestion.

In another study Abramson (4) gave the MMPI to 22 subjects under conditions similar to those listed above. He found three groups of items: those scored both times, those scored after alcohol ingestion, and those omitted after alcohol. Post-alcohol profiles showed lower lie scale and most fluctuations ocurred on the Pd and Mf scale. Repetition of the test under these circumstances reflects change in attitude by variation in the height, rather than the shape, of the curve. Abramson suggests that the shape of the curve may indicate the trend of future difficulties under adverse emotional stress.

Harris and Ives (105) matched 19 chronic alcoholics with a control group of mixed psychoneurotics. The results suggest a general neurotic structure for alcoholics. The Pd scale is greater for alcoholics with a significant emphasis on self-rapport. There is evidence of considerable intra-individual conflict in alcoholics with less general social-emotional upset.

Manson (144) compared 314 male alcoholics with 222 male non-alcoholics on the Pd scale of the MMPI. The alcoholics made significantly higher scores on a specially prepared booklet form of the Pd scale. Thirty-nine of the items of the Pd scale (78 percent) were diagnostic at the five percent level or better.

A study of eight chronic alcoholics by Rubin (174) using analysis of variance techniques produced no significant differences (see Chapter 4). Visual analysis of the mean profile presented for alcoholics shows that they score highest on K, D and Pd scales.

Brown (25) used the MMPI to study 80 hospitalized chronic alcoholics. She and two other raters sorted the profiles into neurotic and psychopathic groups. They secured 34 in the chronic alcoholic neurotic group and 33 in the chronic alcoholic psychopathic group on which there was total agreement of raters. These groups were compared to 20 cases diagnosed as psychoneurosis and 20 cases diagnosed as psychopathic personality. Brown concludes "the chronic alcoholic group as a whole does not show a typical pattern which is readily discernible from other groups. However, when differentiated into those showing primarily neurotic and psychopathic patterns, they show striking differences within the (alcoholic) group, and greater similarity to neurotics and psychopaths who do not drink." The chronic alcoholic neurotic group had most frequent elevation on the D scale, while the chronic alcoholic psychopath group had most frequent elevation on the Pd scale. It would have been interesting if Brown had been able to present evidence of differential prognosis for the two groups. According to the evidence presented for groups, a profile for the neurotic group might seem to offer greater prognosis of success than that for the psychopathics. The anxiety index of Welsh (205) might prove highly useful in discriminating between these groups.

Ruesch (177) presents a comparison of work versus lactic acid production for various pathological groups. He points out that, with the exception of cases of brain disease, personality disorders complain more about fatigue in general than do psychotics. Using an index of efficiency of work performance over lactic acid production, Ruesch found that personality disorders secured a higher index

than psychotics. Persons with high lactic acid production during work score significantly higher on the MMPI (psychotics). He claims that general complaints of fatigue found in psychopaths, psychoneurotics and delayed recovery cases are due to psychological causes and are not a function of physical fitness.

Burton (34) examined the efficacy of the Mf scale of the MMPI for diagnostic purposes with cases of sexual inversion. Significant differences were found between mean score of 34 sex inverts and 20 rapists, and between the inverts and 87 delinquents with criminal charges other than rape or inversion. The reliability of the Mf scale in this study is considered too low for individual prediction (.70 ± .09). However the reliability of the Mf scale as shown in the table in Chapter 1 would seem to indicate that it is higher than shown by Burton's study.

The effect of alcohol on MMPI scores is to change the level of the profile, but not the shape of the curve. After ingestion of alcohol the lie scale decreases and there is a tendency for scores on Pd and Mf to fluctuate. The MMPI profiles of chronic alcoholics are elevated on the neurotic triad and the Pd scale. It is possible to divide alcoholics into groups having a profile similar to neurotics and to psychopathics. Alcoholics score significantly higher than normals on the Pd scale. Personality disorders complain more about general fatigue than psychotics. The varying reliabilities reported for the Mf scale raise some question of its use for individual prediction.

Chapter 7

USE IN HIGH SCHOOL, COLLEGE AND OCCUPATIONS

Tests of the readability of the MMPI have shown that it is usable at the junior high school level according to Johnson and Bond (129), but few attempts have been made to use it below the college level. Johnson and Bond point out that the Flesch reading ease formula gives a score of 88 for the MMPI. Such a readability score is equivalent to a grade level of 6.0. It means that the MMPI can be read and understood by individuals with an I.Q. equivalent of 80 or higher on individual mental tests and a mental age of 12.0 or higher. Johnson and Bond checked their results by applying the Lorge reading formula also and secured a grade level of 6.1. They point out, however, that extreme variability in junior high school groups requires that more attention be paid to the poorer readers in these grades, if they are given a test like the MMPI. The chief problem involved in use of the MMPI in high school or junior high school is not readability, but the controversial nature of some of the items, particularly those dealing with sex.

Use in the High School

Studies dealing with high school age populations are confined mostly to investigations of delinquent behavior, although scales for achievement, social status, and social introversion have been reported. Contrast between scores of Indian boys and girls and those of whites of equivalent age and sex are included in one study and two studies report use of the MMPI to investigate parent-child relationships.

Capwell (38, 39) contrasted the MMPI scores of 101 delinquent and 85 non-delinquent girls between ages 12 and 18. These girls had an I.Q. above 60 and were equated for age-grade and urban-rural factors. There were no significant differences found on the MMPI between groups with a constant and an improved I.Q. (38). The group with constant I.Q. was more retarded in school achievement and came from homes representative of lower socio-economic status. There was a significant difference in MMPI scores between delinquents and non-delinquents (39). The critical ratios on the first test differentiated between the groups on all scales except L and Hy, and on the second test on all scales except Hy. The greatest differences are on the Pd and Pa scales. Delinquents were higher on F, Pd and Pa with average scores on the neurotic triad. Monachesi (159) studied 48 delinquent and 79 non-delinquent girls and 49 delinquent and 56 non-delinquent boys who were matched on socio-economic status. Significant differences were found for girls with delinquents being higher on F, Hs, Hy, Pd, Pa, Pt and Sc. Non-delinquent boys were higher on Pd and delinquent boys were higher on Pt. Monachesi concludes that in this sample the MMPI does not discriminate between males. Van Vorst (199) also reports that test performances on the MMPI for a "small" number of psychopathic delinquent boys do not justify any characteristic response pattern for psychopathic personality.

Schiele and others (180) discuss 100 cases of psychopathic personality from the federal reformatory at El Reno, Oklahoma. They present a profile with the Pd scale at T = 70 and say "If other high points occur in these cases the ten-

dency is for them to be at Pa or Sc . . . . If these are measured soon after being caught, D is likely to be high." They do not feel that psychotherapy is very effective with individuals whose MMPI scores indicate psychopathic personality.

Kalhorn (131) attempted an analysis of parent behavior of mothers who received high MMPI scores contrasted with those who received low scores. Both groups differed from the average in parent behavior, primarily on the behavior cluster "indulgence".

Arthur (14) discusses an experience in examining 51 twelfth grade Indian girls and 21 twelfth grade Indian boys with the MMPI at Haskell Institute, Lawrence, Kansas. She contrasted them with white students of equivalent age who were applying for admission to the University of Minnesota. Indians showed less tendency to hysteria, a greater Pd score and lower scores on the Hs scale. Indian girls were more depressed than whites. Indian responses showed greater social and environmental maturity than pre-college students, but at the same time were more shy, easily embarrassed and self-conscious. As a group the Indian twelfth graders had good emotional adjustment. Their fears centered around natural forces beyond human control, such as fire or thunder and lightning.

Gjerde (81) investigated parent-child relationships in vocational interest and personality traits. He gave the MMPI and the Strong Vocational Interest Blank to ninth and tenth grade pupils in the laboratory school of the University of Chicago. The two highest correlation coefficients were between father and son (.31) and between mother and daughter (.27) on the Mf scale of the MMPI. Most of the other coefficients were zero or low positive.

Gough has published a number of studies dealing with high school students (86, 87, 88, 89, 90). These have been connected with the development of new scales (Si, St, Ac) for the MMPI and have been discussed at the end of Chapter 3.

Use in College

More research is available on the MMPI scores of college students. Some of this research has been reported elsewhere in this paper and will only be recapitulated briefly in this chapter to maintain coherence.

The studies of college students reported here can be divided roughly into the following areas: those dealing with general screening for attitudes and personality traits; those dealing with achievement; those dealing with the relationship of ability, interest and psychopathology; and those dealing with specific curricula, particularly teacher training.

Hampton (101) reports on the use of the MMPI in diagnosis of personality disorders among female college students. T-score means and standard deviations are given for 407 females at Western College. These means are approximately average for MMPI norms except for Hs which is a half standard deviation below average and Mf which is a half standard deviation above average. The most frequent personality syndrome for these female college students was the psychotic triad. The next most frequent was a rise on Pd and Ma scales with the third pattern in order of frequency a rise on the neurotic triad. It is not clear how Hampton used the MMPI for he says "With the clinical pictures of deviate students delineated by means of the Multiphasic Inventory it became comparatively easy to classify the personality difficulties reported by students and institute proper treatment in line with the diagnosis". If this means a screening process or clarification of complex diagnoses, it could be considered appropriate. If it means

acceptance of MMPI scores over clinical diagnoses, the procedure is highly questionable. The importance of this study lies in the evidence of variation of the sample of college females from general population norms on the Hs and Mf scales and the frequent rise on the psychotic triad.

Brown (24) studied similarities and differences on the MMPI for 176 college males and 366 college females. He reports that in college student profiles Hy is higher than Hs and D. The Hs, D and Pt scales are usually below the mean of general population. All profiles have high points at Hy and Ma with females higher on Pa and males higher on Mf. These students in the General College at the University of Minnesota were significantly different in an abnormal direction from the original MMPI college normative group on all scales for males and on all scales except Hs and Sc for females.

Brown compares his group with four other college groups in addition to the normative group. He concludes that local norms should be established for college groups because answers reflecting an individual's culture and environment may produce different scores in samples from different schools. Such affect may be produced by cultural-economic status of the home, geographic location, education of parents, religious background of home and educational aspirations of parents for children.

Fry (79) also found that college students tend to have mean T-scores of one-half to one standard deviation above general population. In a study comparing 121 male and 115 female students at the Pennsylvania State College with 98 male and 109 female inmates of two Pennsylvania state prisons, Fry states that male and female prisoners were more variable on the MMPI than were college students, but no *F* ratios are reported. Male college students exceeded male prisoners on mean Mf score, but the prison males were significantly higher on Hs, D, Pd, Pa, Sc and Ma. There were no significant critical ratios between white and negro prisoners. College males were significantly higher than college females on the Hs, Pt and Mf scales. A number of other differences are discussed, but it is difficult to determine whether these are due to heterogeneity of variances or true differences in the samples. The percentile norms reported for college students are based on the two groups of one hundred-plus listed above and are questionable even for local use because of the small number of cases.

Rose (171) studied homesickness of female college freshmen using the Bell Adjustment Inventory and the MMPI. It was found that those who had been homesick frequently had higher scores on the social and emotional scales of the Bell and on the MMPI D, Pt, and Hs scales, but these higher scores were not statistically significant. The conclusion that "emotional instability and other neurotic traits predispose a girl to homesickness" is not justified by these data.

Altus (7) gave 100 general psychology students the group MMPI and group Rorschach. The 25 highest and lowest on the Sc scale were selected for item analysis of the group Rorschach. Ten items were differentiated and Altus concludes "Whatever the Sc scale of the MMPI is measuring the Rorschach items are measuring to an appreciable degree also". The paper contains a list of these significant Rorschach items.

Johnson (128) compared scores of 150 male and 50 female college students on the MMPI and Stone's Measurement of Religious Attitudes Inventory. The only significant correlation between this latter inventory and the MMPI was for the D scale (-.287). Males with high "religiosity" score tended to have higher Mf

score. Students in the group with high religious attitudes had a smaller number of abnormal profiles. She concludes that "a positive relationship exists between religiosity scores and normal personality profile scores".

Drake's development of an Si scale (64, 66) to measure social introversion of college students has been discussed in Chapter 3.

The Mf scale of the MMPI was included in a comparison of four masculinity-femininity scales by Heston (118). He presents data for 34 males and 45 females on the MMPI Mf scale and that of the Strong Vocational Interest Blank, the Kuder Preference Record and the DePauw Adjustment Inventory. The Mf scale of each test is described and group means and standard deviations are presented. Heston reports that these Mf scales are 80 percent satisfactory in placing men above and women below the mean score. The MMPI Mf scale was the most effective in doing this.

Several studies have attempted to identify personality characteristics of college underachievers. Winberg (213) reports that the use of the Minnesota Personality Scale, the Owens Personal Checklist and the MMPI show that while research is still incomplete, "there are certain maladjustive personality traits characteristic of underachievement in an academic situation". Owens and Johnson (165) report further on the preliminary study above. From 764 male college freshmen they selected on the basis of deviation from predicted grade point average by one letter grade; 50 underachievers, 60 normal achievers and 54 overachievers. These subjects were given the Minnesota Personality Scale, the Owens Personal Checklist and the MMPI. Item analysis gave 38 differential items. Fifteen of these items dealt directly with social adjustment. Underachievers selected better adjusted or more extrovert responses. Symptoms of neurotic or psychotic character were not prominent.

Since these subjects were all engineering school students it is possible that they are too homogeneous to exhibit neurotic or psychotic differences. Because only measures of personality were used it is difficult to determine whether the differential items identified by Owens and Johnson are due to differences of achievement in an engineering curriculum as a result of poor placement or whether they are due to personality traits contributing to variance in achievement of potential engineers.

Another study of college achievement is reported by Bolander (23). Honor point ratio was predicted from the Ohio State Psychological Examination. From a group of 219 Bolander selected 59 underachievers and 59 overachievers. When these were compared on the MMPI, underachievers showed significantly higher scores on the Pd and Ma scale and a tendency toward high Pt scores.

Altus (8) equated two groups of 25 college students who were one-half standard deviation above or below the mean of psychology class test scores on an intelligence test. He found a trend toward slightly greater maladjustment of underachievers on eight of the clinical scales. The only scale showing a significant difference in mean score was the Ma scale which was higher for underachievers. An analysis of 60 differentiating items showed that the characteristics of the nonachieving group were greater femininity, immaturity, fearlessness, self-assertiveness and manic tendencies. As in the study by Owens and Johnson the best discrimination was on social aspects and the Si scale. Altus reports 26 items useful in the prediction of college achievement. He claims these items are relatively independent of intelligence test scores.

A number of people have attempted investigation of the relationship of interests and abilities to personality as measured by the MMPI. Berdie (17) studied the range of stated interest by comparing answers of 230 abnormals differentiated by psychiatric check to answers of 700 normals on an oral and printed list of 22 recreational activities. The mean of the abnormal group was 6.9 and that of the normals was 12.8. Berdie concludes that range of interests is a function of psychiatric status, age and educational level. He compared MMPI scores for 27 cases with an interest score of 20 or more to 31 cases with an interest score of 13 or below. Significantly lower scores for the group with high range of interests were found on the F, Hs, D, Pt and Sc scales. Berdie states that there appears to be no relation between the hysterical syndrome and range of interests.

Hawkes (117) matched two groups of 29 male and 8 female college students on age, sex, class rank and USAFI score on English and reading in natural science. The experimental group was deviate two standard deviations above the mean MMPI scores on the Hs, D and Hy scales. These two groups were given the Kuder Preference Record and compared according to occupations suggested in the manual versus stated interest. There was no significant difference in grade point average for the two groups, but the experimental group tended to make lower grades. There were no differences between groups in referral to deans, rating by faculty advisers or withdrawal from college. The only significant differences found were for the better adjusted (control) group to select more fitting vocational objectives and to participate more in social activities. Hawkes considers the MMPI useful as a screen for personal counseling of college students.

Fassett (74) investigated scores of 50 veteran and 56 non-veteran male college freshmen on the Strong Vocational Interest Blank and the MMPI. There was no significant difference in interests, but she claims veteran's interests are "more fully crystallized" because they secure more A and B+ scores on the Strong. MMPI scores show no significant difference in central tendency between these groups on any scale, but veterans show greater variability on several scales and appear more often in the deviate area. Mean score for the Mf scale of both groups is above the mean of the normative group. There are no differences in the two groups on the Si scale which would indicate they are different from average college students.

Wesley and others (207) compared scores of 156 male college students on the Kuder Preference Record and a number of measures of ability selected to correspond to the Kuder interest categories. They investigated the effect of age, intelligence and personality factors using the Army Alpha and the MMPI. Mean scores of the upper and lower 25 percent of the group selected on the basis of interest-ability agreement were compared on the clinical scales of the MMPI. The only significant difference found was for the Sc scale, with higher score characterizing the group showing greatest agreement between interest and ability. This group also showed more deviate scores on seven other clinical scales. No adequate explanation of this phenomenon is attempted.

Blum (22) gave the MMPI, Strong Vocational Interest Blank and a 17 item personal data questionnaire to groups of 25 male college students in five curricula. They were enrolled in education, law, journalism, medicine and engineering. Most of these students were seniors or advanced students in professional schools. Blum found significant differences among groups for the following scales: the Hs scale with education students lowest and mechanical engineering students

highest, the Sc scale with mechanical engineering students lowest and medical students highest, and the Si scale with law students lowest and mechanical engineering and education students highest (most introverted). Although the number in each group is rather small it would appear that analyses of variance indicate significant differences among groups on both the MMPI and the Strong. The greatest differences among the five groups were on the Strong rather than the MMPI. There was little relationship evidenced between interest and personality inventories.

Blum reports that the MMPI Mf scale has moderately high but significant correlations with the Strong groups I, II, III, IV, VI, VII, X and XI and no relationship with groups V, VIII and IX. This does not make sense, in that a feminine score on the MMPI correlates with Strong scales which are primarily masculine in nature, unless one assumes that Blum reversed the sign of the correlation without stating that this was done. Other scales of the MMPI that have significant correlations with scales of the Strong are: Pt with VI and XI, D positive with II and IV and negative with IX, Sc positive with I and III and negative with VIII; Si positive with II and III and negative with V and IX. Correlations with non-occupational scales of the Strong show a negative correlation between Pa and occupational level and between Pt and Interest Maturity, and a positive relationship between the two Mf scales after reversing the sign of one of them.

Most of the studies dealing with curricular groups have been devoted to prospective teachers. Nance (163) studied 51 male and 51 female teachers college sophomores using the Strong Vocational Interest Blank, the Guilford-Martin Inventory of Factors GAMIN and the MMPI. He found that both sexes scored higher than general population norms for the Mf scale on all three tests. Music students secured the most feminine scores.

Lough (141) reports MMPI results in a study of female teachers college students, the majority of whom were freshmen. Of this group 74 were preparing for elementary teaching and 111 were preparing to teach music. Lough states that the mean of the music students was lower than the elementary group on the Pt scale. The lowest mean for the music group was on the Hs scale and the highest was the Ma scale. The lowest mean for the elementary group was on the Pt scale and the highest was the Ma scale. Both groups were one-half standard deviation above the normative group on the Ma scale. There were no significant differences in means between the two groups. Lough concludes that teachers college students are 'normal' with a tendency to higher scores on Ma, but students preparing for elementary teaching secured high individual scores on Pd, Pa and Sc, while those preparing for music education secured high individual scores on Ma, Hy and Pa.

Another study by Lough (142) compared the two groups above with 61 college females in a nursing curriculum and 54 college females in a liberal arts curriculum. No significant critical ratios were reported for mean T score differences of these four groups. However, correspondence with Dr. Lough indicates that there was a constant error in her data. Revised tables of critical ratios appear in the *Journal of Applied Psychology* (143) which indicate that there are significant differences between nurses and liberal arts students on the Mf scale and between nurses and music education students on the Hs, D, Mf and Sc scales. The nurses are more masculine and the music education students more deviant on the other scales showing differences. All groups were one-half standard deviation above the norm group on the Ma scale.

Lough concludes that the "MMPI has little or no value in educational selection; it is not a useful instrument for differentiating between those who are more suited for one occupation than another except, perhaps, for women desiring to prepare for the nursing profession". Such a conclusion bearing upon these groups listed above may be justified, but use of freshmen rather than seniors to identify curricular groups is questionable because many freshmen may later change curricula or leave school before graduation. Thus there are apt to be less differentiating characteristics among freshmen in general and among these particular groups of freshmen women except for the extremes, namely, music education and nursing.

Bursch (33) presents scores for seven cases of male vocational agriculture teachers in graduate work who took the MMPI, Kuder Preference Record and furnished statements of personal satisfactions and dissatisfactions. In spite of the small number of cases presented, there is a tendency for this group to score one-half standard deviation above average of the normative group on the Hy, Mf and Ma scales.

Kahn and Singer (130) selected from juniors and seniors in a college of commerce 15 students with excellent academic record and 13 students frequently on probation. These two groups were given the American Council on Education Psychological, the Wechsler-Bellevue, the MMPI, the Rorschach, an autokinetic test and a study habits inventory. There was a significant difference in means on the Wechsler and ACE. The only significant difference on the MMPI was for the poorer academic group to be higher on the Sc scale. Both groups were at least one standard deviation above the normative mean on the Mf scale.

The most complete study of curricular groups on the MMPI is that of Bier (19). He gave the MMPI to 924 unmarried Catholic male college students. These were divided into 171 major seminarians, 208 medics, 121 dental students, 55 law students and 369 general college students used as controls. All groups showed less satisfactory adjustment than the normative group and the seminarians were the most deviate. Marked age differences were equated by covariance techniques because there was a general tendency for higher scores at higher age levels. This tendency was most apparent for the neurotic triad, Mf and Ma scales. After age was equated the area of greatest difference between group means was on the neurotic triad and the Ma scale. The largest differences occurred on the Mf scale. The Pd and Pt scales showed the least intergroup differences.

Bier points out that psychological adjustment transcends vocational lines. All of these groups present similar variation in adjustment, but in varying degrees. In spite of this, Bier was able to differentiate curricular groups. The seminary group was most different from other college groups and clearly different from general population (the normative group). There are a number of areas of adjustment which uniquely specify the seminary group. In order these were the Mf, Ma, Sc, Hs, D and Pa scales. The seminary and law groups were most like each other and most different from medicine and dentistry.

Bier also contrasted the well and poorly adjusted within each group. He points out that the well-adjusted seminarian differs far more from the poorly adjusted seminarian than he does from the well-adjusted members of the other four groups. The differences between these two segments of each group exceeded the differences between groups, although the number of significant intergroup differences is less for the extremes than for the total groups. Bier reports that the "well-adjusted consistently mark less of the items 'true' and more of them 'untrue'

than the poorly adjusted" (19:64). The best discrimination between the well-adjusted and poorly-adjusted was furnished by the Pt scale and the least by the Pa scale. Bier says that it is worth noting "the surprisingly large portion of the total number of items supplied by these least and most discriminating items, the average being 73.4 percent and reaching in the Pd scale 92.0 percent of the total" (19:76).

Bier's item analyses indicate the items of greatest differentiation within and between groups. The burden of differentiation is carried by relatively few items. Items which differentiate the well and poorly adjusted on one group do this for other groups also.

It is interesting to note how the findings of Bier's study support the empirical evidence developed in counseling. We would expect the MMPI to differentiate best between the individuals having good and poor adjustment, but we would also expect it to be able to differentiate curricular groups. Counseling experience and research would lead to the expectation that seminary and law groups would be more alike and most different from medicine and dentistry. Counseling experience also leads us to expect an increase of score with age and for the greatest differentiation of college groups to be on the Mf scale.

The MMPI can be used to screen college students to identify those needing personal counseling. College groups tend to be more deviate than general population on the MMPI. Males tend to score higher on Hy and Mf and females on Hy, Pa and Ma. Local norms should be established for college students. College underachievers tend to score high on Pd and Ma, with lower score on Si. Veterans show greater variability on the MMPI than non-veterans.

Better adjusted college students tend to select more fitting vocational objectives and to participate more in social activities. However, Wesley and others (207) found that the college group with greatest agreement between interest and ability tended to secure more deviate MMPI scores, particularly on the Sc scale. Lower MMPI scores seem to characterize college groups with wide range of interest. Blum, Lough and Bier found significant curricular group differences which appear to warrant attempts at profile or item analysis of curricular groups.

Vocational Use

In spite of the fact that the validating scales of the MMPI offer an excellent check on the honesty with which the instrument is answered, few attempts have been made to develop it for vocational selection. Research in the vocational area has shown that personality factors are fully as important in the selection of personnel as are ability and interest, hence it is interesting to note the attempts to adapt the MMPI to this purpose. These attempts include a study of women clerical workers, saleswomen and women optical workers; a study of male insurance agents and female social workers; a study of male artists; a study of professional actors; a factorial study of submarine personnel; the use of the MMPI for vocational advisement of veterans, and the construction of a job satisfaction scale.

Verniaud (200) investigated MMPI scores of 40 female clerical workers, 27 department store saleswomen and 30 female optical workers. The clerical workers were significantly lower on the Hs scale and approximated scores of an undifferentiated sample of general population. Saleswomen scored significantly higher on the Mf scale and lower on the psychotic triad. The optical workers scored significantly higher on the Pa and Pd scales. The tendency toward a higher Ma

score for industrial women was the most marked clinical deviation. Verniaud gives illustrative cases and says "the available clinical evidence was as clear as the statistical in pointing to relationship between type of work, type of worker and characteristic responses on the MMPI . . . . There are group differences in the personality of successful workers corresponding to gross differences in job requirements, and some of these differences may be identified by the Minnesota Multiphasic Personality Inventory."

Lewis (137) compared scores of 50 white male insurance agents and 50 white female social workers to the normative groups on the MMPI and the Kuder Preference Record. Scores on appropriate Kuder scales were inversely related to MMPI scores. No attempt at pattern analysis was made. The scores of male insurance agents were significantly higher (.02 level) than the MMPI norm group on D, Hy, Pd, Mf, Pa and Ma. The scores of female social workers were significantly higher (.02 level) than the MMPI norm group on the D and Hy scales. Both groups had high mean scores on the persuasive and social service scales of the Kuder.

Spiaggia (192) matched 50 New York City male art students with 50 non-art males on age and I.Q. Administration of the MMPI indicated that art students had significantly higher scores on all clinical scales except Hs and Hy with Mf showing the greatest difference.

Chyatte (42) studied the personality characteristics of 50 professional actors and a control group of 50 non-actors equated for age and Otis I.Q. Differences significant at the .01 level were found on the Pd, Mf, Pa and Ma scales with the mean for the actors higher. A difference significant at the .05 level on the Hs scale with actors lower and on the Sc scale with actors higher is also reported. The Pa scale is the only significant one where the difference might be due to variance.

Cook and Wherry (48, 49, 50) performed a modified centroid factor analysis of scores of 120 naval submarine enlisted candidates on the MMPI, the general classification test, a basic battery of written tests, a two-hand coordination test and a personal-medical history questionnaire. Six independent factors were found: tendency to personality maladjustment, numerical-verbal intelligence, tendency to over-activity, tendency to paranoia, mechanical coordination, and masculinity-femininity. People who do well on the GCT and an arithmetic test get lower scores on the L scale of the MMPI. High scores on neurotic elements tend to make the individual rigid and confused in two-hand coordination. A feminine score for males on the Mf scale is related to lower mechanical aptitude score.

Daniels and Hunter (61) report MMPI patterns for various occupations. Much of the article is based on empirical evidence. The number of cases reported for each category is too small. There are 14 occupations with 5-9 cases; 10 occupations with 10-15 cases; one occupation with 19 cases (auto body repairman) and one occupation with 33 cases (auto mechanic).

Harmon and Wiener (102) report on the use of the MMPI for vocational advisement. They claim it has served to outline personality characteristics for job choice and for prognosis of success in training. While illustrative cases are given, no validation data in the form of follow-up evidence is presented. Harmon and Wiener claim that elevation on the neurotic triad. the most frequent scores found, should be interpreted to mean avoidance of dirty, heavy jobs and placement at the lower end of an individual's ability level to avoid emotional stress. When the psychotic triad is elevated there is a poor prognosis of vocational suc-

cess. When Pa and Sc are elevated the person should be placed in a relatively routine, well-regulated job which does not require initiative, self-discipline or social contact. Elevation of Pd and Ma indicates an undisciplined job with a variety of work, initiative, aggressiveness and changing locale or associates. These claims need to be checked further by follow-up studies, but appear to have face validity on the basis of empirical evidence from counseling.

Foster (77) attempted to develop a job satisfaction scale for the MMPI using 200 voluntary WPA workers from minor technical and clerical jobs on a college campus. There were 115 males with median age of 38 years and 85 females with median age of 32 years. Most of the men were married, the women were single. The control group was the general population norms of the MMPI. The experimental group was more highly educated and the females of this group (mostly clerical workers) secured lower scores on the Hs scale than the controls (see Verniaud's study above). Foster lists 53 items of a job satisfaction scale with a reliability coefficient of .73. This scale was not administered to another group and the reliability appears too low for individual prediction.

Scores on the MMPI for 36 embalmer trainees compared to 100 veterans with other vocational objectives are presented by Wiener and Simon (211). Significant differences were found on Hs, D, Mf, Pa and Ma with embalmer trainees higher on Hs and Ma. The strongest possibility of profile uniqueness is the Hs scale. Subtle scores are higher than obvious scores. This appears to be a general characteristic of the scores of successful workers in any occupation. This study does not support stereotype characteristics suggested from empirical sources.

These studies indicate the possibility of constructing characteristic MMPI profiles for occupational groups. While the attempts to the present are meager they do show the following results. Verniaud found scores of clerical workers similar to general population, while saleswomen were more masculine. Women optical workers scored high on Pd and Pa scales. Female social workers score high on D and Hy scales, while male insurance agents score above the normative group on D, Hy, Pd, Mf, Pa and Ma. Male art students and professional actors each tend to have characteristic group profiles which are deviate from a general group. Embalmer trainees tend to score high on Hs and Ma and lower than a general group on D, Pa, and Mf.

Chapter 8

USE IN THE ARMED FORCES

A number of studies made in the armed forces during World War II have been described in previous chapters and will not be recapitulated here. Ellis and Conrad (73) have reviewed the effectiveness of personality questionnaires in military practice. Seven of the studies they reviewed use the MMPI. They report that MMPI studies validated against a pass-fail criterion of military success showed little efficiency. They do note however that personality inventories used in service usually did make some definite contribution to psychiatric screening and that those validated against a psychiatric criterion gave considerably higher validity than corresponding civilian studies. Hunt and Stevenson (125) in discussing personality testing in military clinical psychology agree with Schmidt and Leverenz that the MMPI makes the clinician aware of one or more personality abnormalities that require evaluation, although the clinical impression may not always be corroborated by the scores. They carefully conclude "as personality tests go, the Minnesota Multiphasic Personality Inventory would seem to be a fairly good test . . . "

On the other hand Morris (160) gave the MMPI to a group of 320 Navy personnel and concludes that the MMPI in its present (1947) stage cannot be regarded as a practical clinical tool. There were 43 controls, 190 psychoneurotics, 21 schizoids and 66 constitutional psychopaths in this study. The psychoneurotics were subdivided into 48 diagnosed as anxiety state, 21 hysteria cases, 36 war neuroses, 57 unclassified and 28 miscellaneous cases. The D scale was significantly above a T score of 70 for every pathological group except hysteria. The only other scales differentiating these groups from normals in the study were Hs and Hy. Significance of difference was computed by *t*-ratios only between the mean scores of the groups on each scale in excess of a T score of 70. This study again demonstrates the fallacy of many early studies that tried to differentiate pathological groups by single scale instead of by profile analysis. Mean profiles presented by Morris clearly show psychoneurotic, psychotic and normal groups, while the psychopathic group is obviously a peculiar selection

Crook (58) in studying use of personality tests in the Army recommends that an abridged form of the Tc-8a (Army MMPI) be developed and reports that the Sc scale was useful in selecting WAC recruits. In reporting on the use of psychological tests for officer candidate screening, Jensen and Rotter (127) state that use of the Pt scale as a ten-minute emotional stability questionnaire did not produce significant differences.

Abramson (3) reports the use of the card form of the MMPI to select specialized military personnel. He discusses in detail the scores of 28 officers on the MMPI versus longitudinal interview data. He emphasizes the similarity of the profile at various levels when administered under varying psychological stimuli and notes the frequency of elevation of Hy and Mf in intelligent, well-educated individuals. He points out that lack of adaptation or impairment of efficiency is correlated with high scores on L, F and Ma as well as general elevation of the profile. He says "an officer who shows even moderate elevations of the lie score often will overconventionalize his own position". Abramson claims the significance of an increased F score is most apt to indicate a lower profile rather than

an important change of the shape of the curve. He feels the MMPI is a worthwhile screening device.

An attempt to use the MMPI to differentiate AWOL recidivists from nonrecidivists was made by Clark (43). One hundred randomly selected soldiers who had been AWOL were composed of 45 first offenders and 55 recidivists. No tetrachoric coefficients varied for the two groups and there was a relatively insignificant difference in mean profiles. An item analysis revealed 24 items differentiating recidivists. These items are listed. The largest number for any scale are seven from the Ma scale and five from the Pd scale. The Ma items reveal hyperactivity, operating contrary to others, seeking thrills, negativism and disregard of social conventions. The Pd items reveal alcoholism, trouble in school and trouble with the law.

Blair (21) reports a study of disciplinary offenders and non-offenders in the Canadian Army in 1948. A sample of offenders was compared to matched and random control groups. The MMPI, attitude scales and a biographical questionnaire were administered. An item analysis of the MMPI yielded many highly discriminating items. Offenders were differentiated from non-offenders by a critical ratio of 3.00 or more on seven scales. Blair suggests that it may be possible to make early identification of offenders by using the MMPI.

The Tc-8a (Army MMPI) was administered by Morton (161) to 3456 enlisted men and 374 WAC applicants. It was given to the WACs as a means of selection for basic training. It was given to the enlisted men to select them for Arctic duty or to identify AWOLs and psychiatric referrals. Only two scales were effective in the prediction of successful WAC basic training. Seven scales predicted AWOLs and psychiatric referrals and three scales were highly significant as predictors of acceptance for Arctic duty. Morton claims the MMPI has demonstrated value for Army use. The suggestion is made in this abstract that differential weightings might increase predictive value for WAC basic training.

Cerf (41) reports an attempt to validate MMPI scores of 400 pilots in primary training against a pass-fail performance criterion. Item analysis revealed 72 significant *phi* coefficients which were unimodally distributed with a central tendency at zero. For this reason it was felt that there were few genuinely valid items for the prediction of success in primary pilot training. O'Gorman and Kunkle (164) tried to use the MMPI to identify rated pilots prone to "pilot error" in aircraft accidents. They found that there was a tendency for high scores on Hy and Ma to be associated with "pilot error" in general. High scores on Pd and Ma were associated with taxiing accidents and high scores on F, Hy and Pd were associated with violations. However, they conclude that the MMPI was of negligible value in identifying "pilot error" in aircraft accidents.

Altus (6) used six items from the MMPI to construct a 36-item oral adjustment inventory for use with Army illiterates. Clark (45) correlated Altus' 36-item test with a twelve point Hs-Hy scale and with the MMPI. He found that the highest correlations were between the two short adjustment tests and the neurotic triad. The pearsonian coefficients were as follows:

The 12-point Hs-Hy scale vs. MMPI Hs = .77
" " vs. D = .65
" " vs. Hy = .75

The 36-point Altus scale vs. MMPI Hs = .75
" " vs. D = .70
" " vs. Hy = .73

The lowest correlations with the MMPI were for the Ma and Mf scales.

Altus and Bell (9) found that 22 items selected from the student form of the Bell Adjustment Inventory correlated as well with "riding the sick book" in the Army as did the Hs scale of the MMPI. The validity coefficient for the 22-item test was .34 ± .042 and for the Hs scale was .37±.079. They finally combined items from these two tests with items from the MMPI Pa scale and the Army Adjustment test to produce an orally administered test of 87 items (10). They state that this 87-item test had an odd-even reliability of .957 for 100 cases. It was useful in selecting graduates and dropouts at an Army training center and is preferable to aptitude for such prediction when used with a highly valid group literacy test. Altus and Bell (10) claim that item analyses showed the MMPI Pa scale items more valid than those from the Army Adjustment test and that individual validities of the Hs scale items were quite good.

Chapter 9

CORRELATION WITH OTHER TESTS

One way of demonstrating validity of tests is to compute correlations with other tests of known value. This has been attempted in a number of instances for the MMPI. These correlations include intelligence tests, the group Rorschach, and a number of specific personality and attitude tests.

The relation between scores on the Wechsler-Bellevue and the MMPI for 48 college undergraduates is reported by Brower (27). The only significant pearsonian coefficients reported between total I.Q. on the Wechsler and MMPI scales are Hs, —.60; Hy, —.65; Pd, —.57. Brower suggests that very superior intelligence "functions as a limiting value in symptom elaboration in maladjustments manifested through the inventory technique". This is contrary to much clinical counseling experience. There it has been noted that very bright young college students tend to score high on Hy, Pd and Mf. An explanation offered for this phenomenon is that they over-anticipate, are too bright for ordinary rules and regulations, and tend to be more interested in people, language and ideas.

Altus and Clark (11) used neurotic triad scores of the MMPI to select normal and maladjusted subjects. The normals had a total neurotic score below 155 and all three scales of the neurotic triad below a T-score of 70. These two groups were given the Advanced S form of the California Test of Mental Maturity. The mean total I.Q. of both groups showed the better adjusted were brighter (119 vs. 112). The poorer adjusted had a markedly lower non-language I.Q. They emphasized this trend for the neurotic to be better at verbal than non-language tasks.

Clark (46) gave the MMPI and the California Test of Mental Maturity and selected three groups. One group of 72 subjects had verbal I.Q. 20 points higher than non-verbal I.Q. and was called a language plus group. Another group of 74 subjects was the non-language plus group. They had non-verbal I.Q. 21 points higher than verbal I.Q. A middle group of 136 subjects had a gap of 10 I.Q. points between verbal and non-verbal I.Q. Clark found significantly higher scores on Hs, Hy, Mf and Pa scales of the MMPI for the language plus group over the non-language plus. The only significant difference in the middle group was for the Hs scale to be higher than the non-language plus group. Clark suggests that it may be wise to use some kind of psychiatric screen with all subjects scoring 20 points higher on the language I.Q. of the California Test of Mental Maturity.

Here again as in the previous study by Altus and Clark we find a relationship between verbal I.Q. and the neurotic triad.

Several attempts have been made to investigate relationships between the group Rorschach and the MMPI. Winfield (214) gave the booklet form of the MMPI and the Harrower-Erickson Multiple Choice Rorschach to 181 enlisted Marine Corps women. She says that "individuals with significant multiple choice Rorschach score did not have any significant scores on the eight major scales of the MMPI". In addition to the lack of agreement between the multiple choice Rorschach and the MMPI, there were no overt symptoms of maladjustment noted by the staff. Some criticisms of Winfield's study are presented by Sisk (191). Sisk claims that reevaluation of Winfield's data shows a positive relationship between poor scores on the multiple choice Rorschach and elevated L scale on the MMPI.

Clark (44) reports a study of MMPI correlates of color responses in the group

Rorschach. A difference in MMPI mean scores indicates that maladjustment tends to be correlated with higher sum C areas, particularly the Hs scale. An analysis of MMPI items and CF shows a greater number of CF responses are linked with impulsiveness and lack of social consciousness. Overconfidence and high Ma score is related to higher CF and sum C scores.

MMPI correlates of movement responses in the group Rorschach of college students are reported by Thompson (197). She analyzed human movement visualized in small detail blot areas and found it related to MMPI scores showing loneliness and withdrawal. More than three animal movement responses were related to MMPI answers showing irresponsible, aggressive, distractible behavior.

Another study of the group Rorschach and the Sc scale of the MMPI by Altus (7) indicated a moderate relationship for normals. Altus believes this relationship would be increased for abnormal subjects.

The remaining studies to be reported in this chapter are comparisons of the MMPI with instruments of particular interest to a specific author.

The Schellenberg Free Association Test was compared to the MMPI by Rosen (172). These tests were given to 110 college women. The first 100 words of the Schellenberg test are from the Kent-Rosanoff list. These first 100 words show a relationship to the Pt scale greater than the .01 level of confidence ($r = .25$) which is higher than the correlation of the 350 words of the entire Schellenberg test ($r = .23$).

Cottle (52, 53) studied relationships between the MMPI, the Bell Adjustment Inventory, the Strong Vocational Interest Blank and the Kuder Preference Record. These coefficients are shown in Table 3. He found little relationship between the personality inventories and the interest inventories, but high relationships between the personality inventories or between the interest inventories. However, when 50 of these cases scoring high and 50 scoring low on the Mf scale of the MMPI were selected by Cottle and Powell (55), relationships were indicated on the Strong and Kuder, as well as the Bell Inventory. Persons who score high on the Mf scale are interested in activities concerned with people, language, art and music, and dislike activities related to scientific and mechanical activities. They also score low (extroverted) on the social scale of the Bell. The converse is true for subjects who score low on the Mf scale of the MMPI. This seems to indicate that heterogeneity of unselected groups obscures relationships between interest and personality inventories unless they are selected with a specific personality scale as criterion.

Fifty female and 129 male college students were compared on the Terman-Miles MF test and the Mf scale of the MMPI by de Cillis and Orbison (63). Both tests clearly differentiated between the sexes but did not correlate very highly with each other. The MMPI Mf scale has 31 items identical or similar to 43 Terman-Miles items. They conclude that both tests were measuring different aspects of masculinity-femininity of interests and attitudes.

Biserial correlations between the Hildreth Feeling and Attitude Scales and the MMPI were investigated by Hunt and Lehner (124). Moderately high negative coefficients were found between Hildreth total feeling score and the following MMPI scales: with D, —.56; Pt, —.49; Pd, —.41, and Sc, —.48.

Lively (139) selected 59 cases with extreme scores on the Heidbreder Introversion-Extroversion Test from a group of college students. She then administered the preliminary card form (504 items) of the MMPI. The mean of the intro-

verts was significantly different from normals on all scales of the MMPI except the Hy scale. The mean of the extroverts was significantly different from normals on all scales except Hs and Pt. Extroverts showed a tendency to high scores on D, Pt, Pd and high scores on the neurotic triad. This does not appear to be a very conclusive study.

Gough (85) reports intercorrelations of Maslow's Security-Insecurity Test showed it was not influenced by intelligence, academic performance or socio-economic status, but it was related to a number of MMPI scales. He used 135 girls and 100 boys and reports that the Hs scale was more important in insecurity of girls, while the Mf scale was more important in insecurity of boys. Intercorrelations between the Maslow test and the various scales of the MMPI were as follows:

K = —.41	Hs = .19	Pd = .23	Sc = .35
L = —.18	D = .40	Pa = .37	Ma = .06
F = .32	Hy = .22	Pt = .46	
Mf (boys) = .40		Mf (girls) = —.16	

Daly (60) studied scores of 83 women on the MMPI and the Kuder Preference Record. She reports that those scoring high on Hs have fewer computational interests. This is obverse validation of Verniaud's report that clerical workers score low on Hs. Daly found that those who score high on Hy like artistic and dislike clerical activities. A high Mf score indicates a significant association between masculinity and mechanical, computational and scientific interests. A low Mf score indicates a significant relation between femininity and literary interests. High scores on Pt accompanied high clerical interests.

The Humm-Wadsworth Personality Inventory and MMPI scores of 238 college students were compared by Gilliland (80). Both card and booklet form were given the same 50 cases to produce correlations ranging from .47 to .88 with a mean of .67. Gilliland concludes "Both forms of MMPI correlated poorly with the Humm-Wadsworth, that is, they are not measuring the same thing".

An attempt to combine items from the Cornell Index and the MMPI to produce a psychiatric screening device was conducted by Grant (96). The test questions and form are included in the article. It is claimed that the screening power of this short test is above 90 percent and that it gives both a quantitative and qualitative estimate of personality maladjustment.

Correlations between the Guilford-Martin Inventory of Factors STDCR and the card form of the MMPI were reported by Loth (140) for 110 college women. She found a divergence from normal expectancy on Mf and the S factor. While each of the factor scales shows a few significant correlations with scales of the MMPI, they correlate still higher with one or more of the other factor scales. High scores on factor scales D and C are accompanied by high scores on Pt and Sc, but there is lesser relation of these factor scales to the D scale of the MMPI. Loth says "the present study does not reveal that any of the traits measured by the factor scales have any great significance in differential diagnosis in practical work". Loth also compares her MMPI and STDCR correlations to those of an unpublished study by Torrens using male medical students and finds considerable agreement.

Correlations between the Guilford-Martin Personnel Inventory of factors O, Ag, Co and the card form of the MMPI were reported by Wesley (206) for 110

college women. This group scored the same as the normative group on the Ag scale, but higher on the O and Co scales. On the MMPI they scored lower than the norm group on Hs and D and higher on Hy and Ma. Highest pearsonian coefficients were between the O scale and Pt (.62) and Sc (.62) with Hy showing a negative relationship to O (—.48). The O scale correlated significantly with all the MMPI scales. The Ag scale showed fewer significant correlations and the Co scale the least. Again a serious lack of independence was noted in the Guilford-Martin factors. The Guilford-Martin scales are measuring more in common with Pt, Sc and Ma than with Pa. Wesley concludes that the "paranoid temperament" as measured by the Guilford-Martin Personnel Inventory is not the same thing as the psychiatric concept of paranoia.

It is obviously impossible to summarize this chapter into any coherent paragraph. Let us point out what seem to be the most significant findings and leave the reader to select the rest.

It would appear that there is a tendency for very superior I.Q. to be negatively related to the scales of the neurotic triad. There is a marked tendency for people scoring high on the neurotic triad to be higher in language I.Q. than in non-language I.Q. on the California Test of Mental Maturity. There would appear to be some slight relationship between the group and individual forms of the Rorschach and the MMPI. When subjects are selected on the basis of a specific personality trait, relationships between personality and interest inventories can be demonstrated. However, a heterogeneous sample will show no relationship between interest and personality inventories.

TABLE 3

Product Moment Correlations for 400 Adult Males between the MMPI and Strong, Kuder and Bell Inventories

	Minn. Multiphasic Personality Inventory											Strong Vocational Interest Blank									Kuder Preference Record									Bell Adj. Inv.			
Test	L	F	Hs	D	Hy	Pd	Mf	Pa	Pt	Sc	Ma	I	II	V	VIII	IX	X	IM	OL	MF	M	C	S	P	A	L	M	SS	Cl	Mf	Ho	He	So	Em
L	-16	-14	03	14	12	-10	-01	-31	-32	-25	-04	-03	08	00	-05	-01	04	-06	-04	-03	03	04	-03	-03	04	-01	09	02	-06	-24	-14	-09	-29
F		40	34	16	45	25	21	55	63	32	14	04	-08	-12	-02	14	-14	01	-13	-05	00	-06	-07	13	10	14	-06	-05	-08	37	28	25	40
Hs			51	59	35	22	18	56	49	28	04	01	-11	03	-01	-02	-10	-04	-04	05	03	-04	-03	09	-07	01	01	04	-04	31	62	19	43
D				42	39	28	26	58	45	-08	17	03	-17	-01	-13	10	-15	-08	-14	02	05	-03	-13	17	00	02	-09	09	-14	21	29	40	43
Hy					29	18	28	18	15	04	02	-08	03	-01	01	05	03	00	-11	-03	-05	-06	02	01	02	05	08	-03	-04	11	40	-07	10
Pd						28	33	50	54	29	06	-01	-05	-07	01	15	-06	-06	-09	-03	-04	-04	-05	06	04	17	-03	-01	-09	47	24	18	41
Mf							32	38	33	04	15	13	21	-14	-03	25	09	-04	-41	-30	-11	-24	-07	03	24	35	-01	03	-03	23	18	15	35
Pa								36	42	11	16	07	02	-11	-08	06	00	-06	-14	-06	-05	03	-13	05	04	17	-02	-01	-16	23	14	19	33
Pt									84	36	19	07	-20	-08	-09	06	-22	-14	-12	00	04	-05	-17	17	-07	15	-12	09	-17	49	41	52	78
Sc										46	18	06	-14	-09	-07	07	-14	-07	-09	01	-01	-02	-15	11	-04	14	-07	02	-13	52	35	44	66
Ma											-04	-02	02	00	13	00	07	00	-02	-01	-10	-07	05	00	-02	09	03	-07	02	32	25	-05	23

Chapter 10

INTERPRETATION

The interpretation to the client of an instrument as complex as the MMPI is determined by the level of competency of the counselor and the depth of evaluation needed by the client. Like any other measuring device this ultimately requires the use of subjective judgment which varies from the simple inferences of the beginning counselor to the subtle blend of objective data and subliminal cues that marks the skilled clinician.

The beginning counselor should heed the warnings about the use of standardized tests found in most texts on counseling. Experience under supervision is the only way to progress toward a deeper level of interpretation. This means that the beginning counselor should confine himself to the evaluation and interpretation of minor deviations among normal cases.

In evaluating minor deviations of normals we need to consider the meaning that the manual gives for each scale, the additional meaning contributed by the research pertinent to each scale shown in Chapters 2 and 3, and the meaning contributed by use of the test in counseling.

The first four scales of the MMPI are used primarily as validating scales in order to determine whether the test was taken properly. However, there are some implications in these validating scales which can be taken as indicators of behavior. The first of these, the *cannot say* category or *question scale,* includes all the items left unanswered. These can be interpreted in two ways. They can be considered as items which an individual cannot honestly answer either true or false, or they may be items which an individual wishes to avoid answering. In either case the elevation of one or more scales may be prevented by omission of such answers, therefore the counselor must take this into account in his interpretation and attempt to check it in subsequent interviews. These elevations tend to be considered significant with normals when they are deviate one-half to one full standard deviation from average ($T = 50$). Therefore the effect of a number of these items in the question category is more pronounced in the normal profile than in the abnormal profile because it will take fewer items to distort a normal profile.

The *lie scale* apparently traps only less bright or naive persons or those with rather strict moral principles. A high score is interpreted in one of these three ways and has to be cross-checked with other interview data.

The *validity scale* (F) will reflect errors in scoring as well as errors by the subject in doing the test. In addition it tends to be high when a high score appears on the Schizophrenia scale or with those persons showing family conflicts accompanied by pessimism or cynicism (See Figures 7 and 12).

The *correction scale* (K) is supposed to function as a suppressor variable to accentuate differences among the clinical scales and sharpen the discrimination of the inventory. Actually it is questionable how much the K scale used alone contributes in this direction. It does indicate by a high score those people who try, even in a non-deliberate manner, to make themselves look better than they really are. In an educational situation such a score is common with scholarship and job applicants. A low score on the K scale seems to typify an individual who tends to be too self-critical. Combinations of the K scale with other validating scales are

useful to identify various characteristics. The malingerer is identified by an F minus K index above a raw score of nine, while a T score average of L plus K above 67 may identify the individual who tries to fake a normal profile.

The ten clinical scales commonly used with the MMPI profile can be interpreted to the ordinary counselee in terms of minor deviations from normality which permit his description as a person in terms of these deviant scales. It shows also how he meets and deals with people.

The meaning of these clinical scales can be interpreted in terms which are stepped down from the psychological explanations in the manual. For instance, a T score of 60 on *Hypochondriasis* is explained as the inclination to be more interested or concerned with personal health than the average person. This counselee is more aware of change in bodily functions than most people. Minor illnesses cause more concern than would be expected. An elevation on the *Depression* scale is interpreted as showing the amount of disturbance the counselee has evidenced. It shows he is disturbed about something and is more subject to depression than are most others around him. This score reflects the pressures which bring people to counselors and may be akin to "Counseling Readiness" or what Welsh (205) has called the "Anxiety Index".

A score above average on the *Hysteria* scale seems to indicate a lack of self-confidence for normals. It represents a tendency to over-react, to over-anticipate a situation, to overplan for it. This individual makes more plans than are needed. Such a person will "sound off" fairly readily and calm down quickly afterwards. This person may present physical symptoms similar to hypochondriasis, but this is a way the body reacts to an unresolved situation.

A high average score on the *Psychopathic Deviate* scale shows the individual who resents rules and regulations. Such a person may be reacting against authoritarian control or may actually have little or no conscience, may be unable to feel deeply about anything. The kinds of people who frequently score high are the very bright person for whose behavior most rules do not fit, the individual who refuses to conform, criminals, certain alcoholics, and sex deviates. It should be noted that a high Pd scale by itself does not necessarily mean sex deviation.

The *Masculinity-Femininity* scale is frequently referred to as an interest scale. It seems to be expressing an interest in activities dealing with inanimate objects (masculinity) versus a liking for activities dealing with people, language, and ideas (femininity). Male teachers will score high on this scale (femininity) because they are interested in working with people. College men as a group score high on this scale. It is reversed for women. A high score for women is a masculine score. So most women who are teachers or counselors will score low on this scale because they are also interested in working with people and this is a usual activity for women.

When the *Paranoia* scale is above average it reflects the individual who feels he is being picked on or discriminated against. This person tends to be subjective and sensitive, to feel that what is said or done is aimed specifically at him. He tends to be more concerned with self than with others and less able to become interested in others. He interprets criticism of his ideas as criticism of himself.

An elevation on the *Psychasthenia* scale indicates the person who is a "Worry Wort". This minor deviation from normal may represent the person who is more orderly and requires more organization. An example of this is the secretary who tries to complete a specific job before she goes home and who frequently takes

office work home in order to get it done. Some employers prefer to select part of their staff for possession of this characteristic. A score above average on the Psychasthenia scale also reflects minor crises in the life of an individual. An example of this would be semester and mid-semester examinations or graduation from school. Anyone in a pressure situation will usually reflect this by a rise in the Pt score, frequently accompanied by a rise on the Depression score.

A high average score on the *Schizophrenia* scale shows the person who avoids reality by daydreaming and fantasy. This person in such a phase of withdrawal usually begins to avoid people and new situations. Such a score is frequently found with scholars at the college level.

A T score of about 60 on the *Hypomania* scale shows an overproductivity of ideas. It characterizes the person who gets more ideas than he can handle productively. This may be the very bright individual or the person classed as an underachiever. The latter category includes not only the delinquent, but also the person whose physical capacity prevents a greater energy output. More information is needed about the relationship of this scale to energy output as well as to scholastic aptitude and sex.

An elevation on the tenth clinical scale (Si) indicates the individual who feels more comfortable alone or in small groups whose members are well-known. A score below average means the socially extroverted person who likes group activities and is poised and confident in social situations. The counselor usually connects an elevated score with research or solitary types of activities.

These are a few of the interpretations which can be used with the minor deviations from average usually encountered in counseling. In these minor deviations on one or two scales there is neither need nor opportunity to consider the pattern of scores, but we do need to consider the balance between the mood or feeling scales (Hs, D and Pt) and the character scales (K, Hy, Pd and Ma). The feeling scales are less stable for a given individual and may be considered as barometers. Their height determines roughly the seriousness of the difficulty. The character scales are indicative of more permanent or habitual kinds of reactions.

Figure 7 illustrates the interpretation described above. The case is that of a college student with a marked family problem for which there was no adjustment suitable to him and to his family. This family difficulty is evidenced by the high F scale composed of the following deviate answers:

1. T My family does not like the work I have chosen.
2. T It would be better if almost all laws were thrown away.
3. F I loved my father.
4. F Any man who is able and willing to work hard has a good chance of succeeding.
5. F I frequently find it necessary to stand up for what I think is right.
6. F I believe in a life hereafter.
7. F I believe in law enforcement.
8. F My hearing is apparently as good as that of most people.
9. T It does not bother me particularly to see animals suffer.
10. F I loved my mother.
11. T My parents and family find more fault with me than they should.
12. T I have reason for feeling jealous of one or more members of my family.
13. T No one cares much what happens to you.

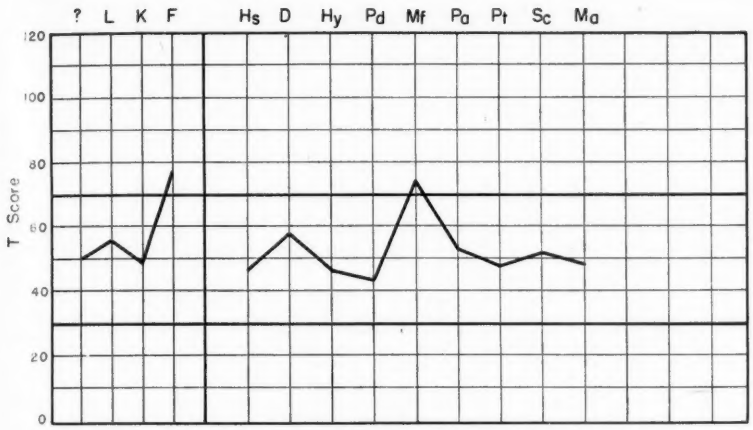

FIGURE 7.—*Profile of College Student with Marked Family Problem.*

14. F I believe there is a God.
15. F I enjoy children.

The cynicism evidenced in these answers is balanced by the average Pa scale showing lack of suspiciousness, the high Mf scale indicating an interest in people and the below average Pd score indicating a tendency to maintain a rigid standard of behavior for himself and to expect it of others. The anxiety which brought this student in for counseling is evidenced in the moderate elevation of the D scale. The distinguishing feature of this profile, however, is the high F scale with family problems; the other scales will vary with the individual case.

This subject made his adjustment by withdrawing from family influences and environment, getting married, and changing to a college course he wanted to take. For his last interview he brought his wife to meet the counselor and was obviously happy in his new environment.

In contrast to this is the profile shown in Figure 8. This subject was a very bright boy, age 18, who was referred just after being dropped by the university for failing work. This was the second university in which he had flunked in a year. An interview revealed psychopathic characteristics in support of the high Pd score. The Hy scale and Pt scale seemed to be reflecting aspects of the character disorder. The Pt scale in particular seemed to be reflecting momentary concern over how his parents would react and an anticipation of punishment. He did not want to make changes in his life necessary to conform to college life nor to come in for further counseling.

These profiles shown above are in contrast to the identification and treatment of abnormals which requires a consideration of pattern analysis as discussed in Chapter 4. As pointed out by Gough (92) we must consider three aspects of the pattern of scores in the diagnosis of abnormals. These aspects are (1) the phases or peaks in the profile, (2) the positive or negative slope of the profile and (3) the overall elevation or height which indicates the seriousness of the difficulty. Here we note that configural aspects are more important than single scales.

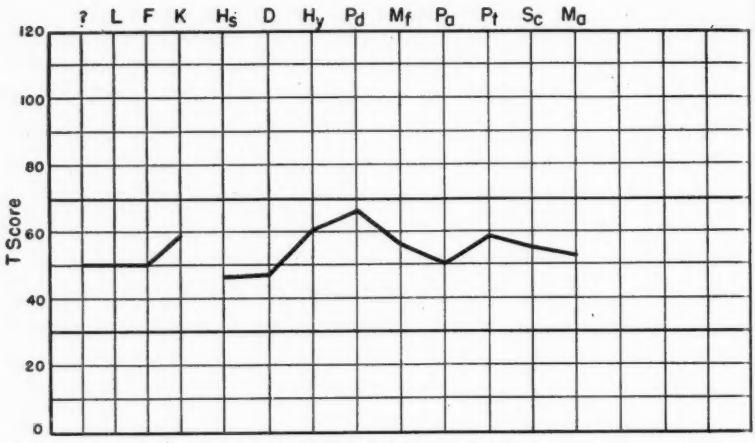

FIGURE 8.—*Profile of College Student with Character Disorder.*

The peaks or phases of the profile usually occur in the neurotic triad, the psychotic triad or the psychopathic scales. The meaning of the pattern of scores varies accordingly. Figure 9 shows the primary peak in the neurotic triad and the secondary peak in the psychotic triad with psychoneurotic and psychosomatic disorders. The reversal of the position of the D scale in the two patterns is the outstanding difference. The slope of the profile in Figure 9 is negative.

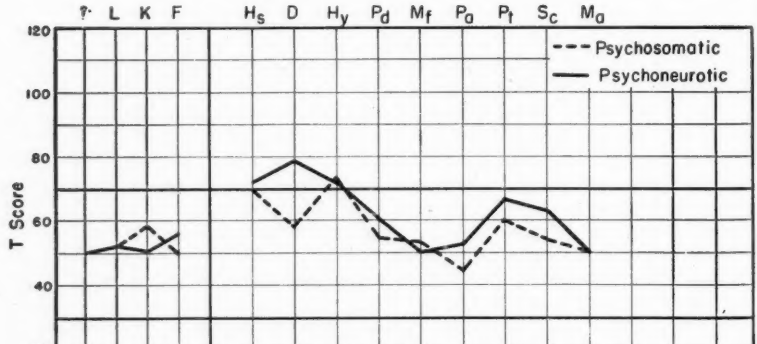

FIGURE 9.—*Typical Psychoneurotic and Psychosomatic Profiles as Shown by Gough* (92). (Adapted with permission from Weider, A. *Contributions Toward Medical Psychology*, Vol. 2, Copyright 1953, The Ronald Press Co.)

Figure 8 does not exhibit the same peaks or phasicality as Figure 10, although both are types of character disorders. Figure 10 demonstrates Schneck's double-spike found in a number of character disorders, particularly underachievers. Here the height of the Pd and Ma scales may be an indication of a more serious condition than in Figure 8, according to the overall elevation, third of Gough's criteria mentioned above.

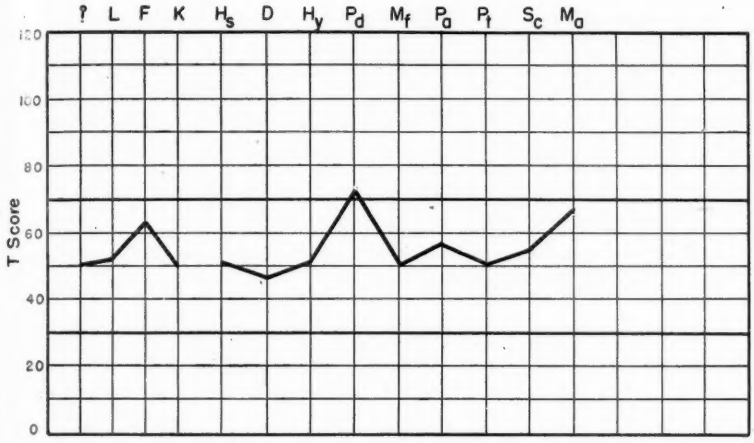

FIGURE 10.—*Typical Psychopathic Profile.*

A typical psychotic curve is shown in Figure 11. Here the primary peak is at Pa, Pt and Sc with a secondary peak at D and Hs. The slope of the profile toward the left is the positive slope found in psychotic patterns.

Two new indices have been developed by Welsh (205). One of these is an anxiety index and the other is an internalization ratio.

The *anxiety index* is an attempt to quantify a measure of readiness for treatment and an indication of prognosis of therapy. It appears to be similar to the term "counseling readiness" used to express the amount of pressure or tension which causes an individual to seek help. Welsh describes it as an anticlinal rise or arch in the neurotic triad with a secondary rise on Pt as shown by the psychoneurotic group in Figure 9. The anxiety index is computed as follows:

$$\text{Anxiety Index (AI)} = \left[\frac{\text{Hs}+\text{D}+\text{Hy}}{3}\right] + \left[(\text{D}+\text{Pt})-(\text{Hs}+\text{Hy})\right]$$

The interpretation of the anxiety index is to expect a value of 50 for normals. The higher the value rises above 50, the greater the anxiety of the client and the better the prognosis of therapy. Reference to the profiles illustrated in this chapter indicates that the anxiety indices computed by T scores are as follows: Figure 7 = 64.6; Figure 8 = 50.6; Figure 9 = 76.7 (psychoneurotics), = 43.3 (psychosomatics); Figure 10 = 44.7; Figure 11 = 84.0; Figure 12 = 128.0. Thus it

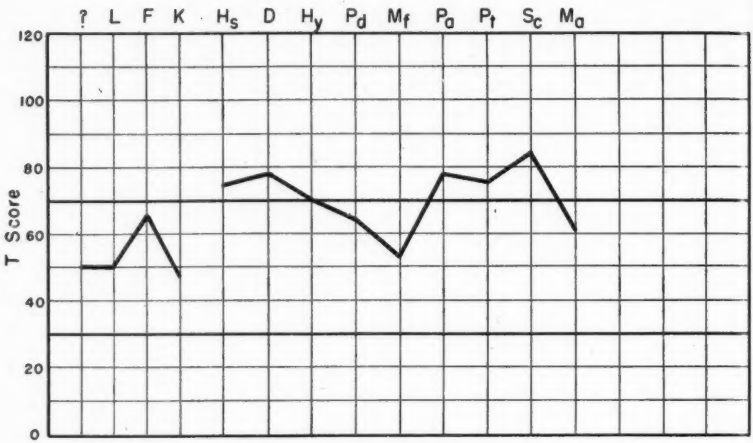

FIGURE 11.—*Typical Psychotic Profile.*

can be seen that in the profiles where one would anticipate a prognosis of continuation of therapy, the anxiety index is high. The character disorders in Figures 8 and 10, on the other hand, show a low or normal index and have a poor prognosis, as does the psychosomatic profile in Figure 9. The few cases shown in these profiles tend to support the contentions of Welsh.

The other index suggested by Welsh is the *internalization ratio*. This consists of the ratio of the mood scales Hs, D and Pt to the character scales Hy, Pd and Ma in the formula:

$$\text{Internalization Ratio (IR)} = \frac{Hs+D+Pt}{Hy+Pd+Ma}$$

Welsh claims that the value for normals is unity (1.00). Subjects who internalize their problems by somatic and feeling reactions tend to score above 1.00. Internalization ratios for profiles of this chapter are as follows: Figure 7 = .98; Figure 8 = .85; Figure 9 = 1.19 (psychoneurotics), 1.00 (psychosomatics), Figure 10 = .78; Figure 11 = 1.16; Figure 12 = 1.05.

Thus we see that the more serious cases are those with an internalization ratio deviant from unity. The amount of this deviation could be considered an index of the degree of abnormality of the case. It is suggested also that a better prognosis of therapy may be indicated for internalization ratios deviant beyond 1.00, while those who act out their conflicts (Pd) score below 1.00.

At first glance the clinician is apt to assume that Figure 12 is a simulated profile. Actually one clinician decided not to do a blind analysis because he was convinced that Figure 12 was not a genuine profile. On the contrary it is a genuine profile of a college senior who is about to be graduated and become an ensign in the Navy. This has caused the deviate scores on D and Pt which are reflecting the anxiety he feels when faced with a situation where he may not be

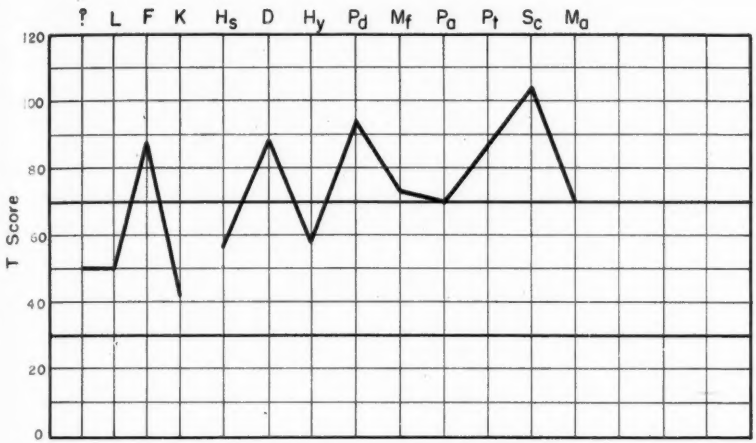

FIGURE 12.—*Profile of College Student with Family Problem and Marked Introversion Tendencies.*

able to apply his unique adjustments developed in college. This urgent situation produces an anxiety index of 128.

He has a history of frustrations produced by a very domineering mother. He expressed his hostility toward her by delinquent behavior during secondary school and by not returning home at vacation time during college. As indicated by the Pd scale his habit of responding to her authoritarian tactics with aggression has become a generalized response to every encounter with authority except in his class work. He has not developed such response in class because he is in a relatively depersonalized scientific curriculum.

In order to forestall the natural consequences of such behavior this student has practiced extreme withdrawal (shown on the Sc scale) in the form of solitary activities such as reading. He is not out of touch with reality except that he had not recognized the cause of his behavior. The balance between external and internal factors is shown by the internalization ratio of 1.05. The limited time available for therapy renders the eventual outcome of his adjustment uncertain. However, the clinicians who evaluated recordings of the interviews were of the opinion that the prognosis was a favorable one.

In conclusion it is pointed out that the use of the MMPI with minor deviations from normality is one of interpreting the balance between scales and the meaning attached to the one or two deviate scales as discussed here and in Chapters 2 and 3, while use with abnormals is a matter of pattern analysis as discussed in Chapter 4. Typical profiles are presented and two new indices are examined briefly, an anxiety index which seems to measure readiness for therapy and an internalization ratio which seems to indicate seriousness of deviation from normality. It should be emphasized again at this point that the counselor best learns to use the MMPI in a counseling situation under supervision, not by reading literature about the MMPI.

BIBLIOGRAPHY, 1940-50

(Most of the bibliographical references whose numbers are followed by a letter are not reviewed in the text. They are recorded here to complete the bibliography.)

1. Aaronson, B. S. & Welsh, G. S. The MMPI as diagnostic differentiator: a reply to Rubin. *J. consult. Psychol.*, 1950, *14*, 324-326.
2. Abramson, H. A. The effect of alcohol on the personality inventory (Minnesota); preliminary report, *Psychosom. Med.*, 1945, *7*, 184-185.
3. Abramson, H. A. The Minnesota Personality Test in relation to selection of specialized military personnel. *Psychosom. Med.*, 1945, *7*, 178-184.
4. Abramson, H. A. The effect of alcohol on the personality inventory. *Annal. N. Y. Acad. Sci.*, 1946, *46*, 535-557.
5. Allerhand, M. E., Gough, H. G., & Grais, M. L. Personality factors in neurodermatitis: a preliminary study. *Psychosom. Med.*, 1950, *12*, 386-390.
6. Altus, W. D. The adjustment of Army illiterates. *Psychol. Bull.*, 1945, *42*, 461-476.
7. Altus, W. D. Some correlates of the group Rorschach and the schizophrenia scale of the group MMPI among two groups of 'normal' college students. *J. consult. Psychol.*, 1948, *12*, 375-378.
8. Altus, W. D. A college achiever and non-achiever scale for the MMPI. *J. appl. Psychol.*, 1948, *32*, 385-397.
9. Altus, W. D. & Bell, H. M. The validity of certain measures of maladjustment in an Army special training center. *Psychol. Bull.*, 1945, *42*, 98-103.
10. Altus, W. D. & Bell, H. M. An analysis of four orally administered measures of adjustment. *Educ. & Psychol. Meas.*, 1947, *7*, 101-115.
11. Altus, W. D. & Clark, J. H. The effect of adjustment patterns upon the intercorrelation of intelligence subtest variables. *J. soc. Psychol.*, 1949, *30*, 39-48.
12. Andersen, A. L. Personality changes following prefrontal lobotomy in a case of severe psychoneuroses. *J. consult. Psychol.*, 1949, *13*, 105-107.
13. Andersen, A. L. & Hanvik, L. J. The psychometric localization of brain lesions: The differential effect of frontal and parietal lesions on MMPI profiles. *J. clin. Psychol.*, 1950, *6*, 177-180.
14. Arthur, G. An experience in examining an Indian twelfth-grade group with the MMPI. *Ment. Hyg.*, 1944, *28*, 243-250.

14a. Barnabus, B. Twelve tests that have proved practical in commercial application. *Trans. Kans. Acad. Sci.*, 1947, *50*, 204-207.

14b. Benarick, S. J. Jr. An investigation of the schizophrenia scale of the Minnesota Multiphasic Personality Inventory. Unpublished Master's thesis, The Pennsylvania State College, 1950.

15. Benton, A. L., The MMPI in clinical practice. *J. nerv. ment. dis.*, 1945, *102*, 416-420.
16. Benton, A. L. & Probst, K. A. A comparison of psychiatric ratings with MMPI scores. *J. abnorm. soc. Psychol.*, 1946, *41*, 75-78.
17. Berdie, R. F. Range of interests and psychopathologies. *J. clin. Psychol.*, 1946, *2*, 161-166.
18. Berkshire, J. R., et al. Test preferences in guidance centers. *Occupations*, 1948, *26*, 337-343.
19. Bier, W. C. (S. J.) A comparative study of a seminary group and four other groups on the Minnesota Multiphasic Personality Inventory. *Catholic University Studies in Psychology and Psychiatry*. Catholic Univ. Press: Washington, D. C., 1948, *7*, 1-107.
20. Birnberg, V. K. The relationship between food aversions and the Minnesota Multiphasic Personality test for college women. M. A. Thesis, Univ. of Minnesota. 1945.
21. Blair, W. R. N. A comparative study of disciplinary offenders and non-offenders in the Canadian Army, 1948, *Canad. J. Psychol.*, 1950, *4*, 49-62.
22. Blum, L. P. A comparative study of students preparing for five selected professions including teaching, *J. exp. educ.*, 1947, *16*, 31-65.
23. Bolander, W. G. A study of the Minnesota Multiphasic Personality Inventory as an indicator in the prediction of college success. M. A. Thesis, Univ. of Oregon, 1947.

23a. Brody, D. S. A genetic study of sociality patterns of college women. *Educ. & Psychol. Meas.*, 1950, *10*, 513-520.

24. Brown, H. S. Similarities and differences in college populations on the Multiphasic. *J. appl. Psychol.*, 1948, *32*, 541-549.
25. Brown, M. A. Alcoholics profiles on the Minnesota Multiphasic. *J. clin. Psychol.*, 1950, *6*, 266-269.

26. Brown, M. N. Evaluating and scoring the Minnesota Multiphasic "cannot say" items. *J. clin. Psychol.*, 1950, *6*, 180-184.
27. Brower, D. The relation between intelligence and MMPI scores. *J. soc. Psychol.*, 1947, *25*, 243-245.
28. Brower, D. The relations between MMPI scores and cardio-vascular measures before and after experimentally induced visuo-motor conflict. *J. soc. Psychol.*, 1947, *26*, 55-60.
29. Brower, D. The relations of visuo-motor conflict to personality traits and cardio-vascular activity. *J. gen. Psychol.*, 1948, *38*, 69-99.
29a. Brozek, J. Psychology of human starvation and nutritional rehabilitation. *Sci. Monthly*, 1950, *70*, 270-274.
30. Brozek, J., et al. A study of personality of normal young men maintained on restricted intakes of vitamins of the B complex. *Psychosom. Med.*, 1946, *8*, 98-109.
31. Brozek, J. & Schiele, B. C. Clinical significance of the Minnesota Multiphasic F scale as evaluated in experimental neurosis. *Am. J. Psychiat.*, 1948, *105*, 259-266.
32. Brozek, J. & Erickson, N. K. Item analysis of the psychoneurotic scales on the MMPI in experimental starvation. *J. consult. Psychol.*, 1948, *12*, 403-411.
33. Bursch, C. W. II. Teacher satisfaction and teacher complaints. *The Phi Delta Kappan*, 1950, *32*, 139-140.
34. Burton, A. The use of the masculinity-femininity of the MMPI as an aid in the diagnosis of sexual inversion. *J. Psychol.*, 1947, *24*, 161-164.
35. Burton, A. The use of psychometric and projective tests in clinical psychology. *J. Psychol.*, 1949, *28*, 451-456.
36. Burton, A. & Bright, C. J. Adaptation of the MMPI for group administration and rapid scoring. *J. consult. Psychol.*, 1946, *10*, 99-103.
37. Canning, W., Harlow, G., and Regelin, C. A study of two personality questionnaires. *J. consult. Psychol.*, 1950, *14*, 414-415.
38. Capwell, D. F. Personality patterns of adolescent girls: I. Girls who show improvement in I. Q. *J. appl. Psychol.*, 1945, *29*, 212-228.
39. Capwell, D. F. Personality patterns of adolescent girls: II. Delinquents and non-delinquents. *J. appl. Psychol.*, 1945, *29*, 289-297.
40. Carp, A. MMPI performance and insulin shock therapy. *J. abnorm. soc. Psychol.*, 1950, *45*, 721-726.
40a. Cauffiel, P. W. A comparison of the P-S Experience Blank with the MMPI. Unpublished M. A. Thesis, The Pennsylvania State College, 1950.
41. Cerf, A. Z. Personality Inventories. In J. P. Guilford (ed.) *Printed Classification Tests*. Army Air Forces Aviation Psychology Program Research Reports, No. 5, Washington, D. C., 1947, pp. 557-621.
42. Chyatte, C. Psychological characteristics of a group of professional actors. *Occupations*, 1949, *27*, 245-250.
43. Clark, J. H. Application of the MMPI in differentiating AWOL recidivists from non-recidivist. *J. Psychol.*, 1948, *26*, 229-234.
44. Clark, J. H. Some MMPI correlates of color responses in the group Rorschach. *J. consult. Psychol.*, 1948, *12*, 384-386.
45. Clark, J. H. Clinical use of the Altus thirty-six point adjustment test in screening Army AWOL's. *J. consult. Psychol.*, 1948, *12*, 276-279.
45a. Clark, J. H. Additional applications of the Altus thirty-six point adjustment test as a screening instrument. *J. gen. Psychol.*, 1949, *40*, 261-265.
45b. Clark, J. H. The adjustment of Army AWOL's. *J. abn. soc. Psychol.*, 1949, *44*, 394-401.
46. Clark, J. H. Intertest variability on the California Test of Mental Maturity in relation to the Minnesota Multiphasic Personality Inventory. *J. consult. Psychol.*, 1950, *14*, 32-34.
47. Cofer, C. N., Chance, J. & Judson, A. J. A study of malingering on the Minnesota Multiphasic Personality Inventory. *J. Psychol.*, 1949, *27*, 491-499.
47a. Cofer, C. N. et al. On the significance of the psychogalvanic response as an indicator of reaction to personality test items. *J. Psychol.*, 1949, *27*, 347-354.
48. Cook, E. B. & Wherry, R. J. A factor analysis of psychometric and psychomotor tests in submarine selection. *Am. Psychol.*, 1949, *4*, 246 (Abstract).
49. Cook, E. B. & Wherry, R. J. A factor analysis of MMPI and aptitude test data. *J. appl. Psychol.*, 1950, *34*, 260-266.
50. Cook, E. B. & Wherry, R. J. *A study of the interrelationships of psychological and physiological measures on submarine enlisted candidates: I. History, experimental design, and statistical treatment of data.* Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn. Report No. 1 of Bureau of Medicine and Surgery Research, 1949.

51. Corsini, R. J. A time and motion study of hand-scoring the individual MMPI. *J. consult. Psychol.*, 1949, *13*, 62-63.
52. Cottle, W. C. Relationships among selected personality and interest inventories. *Occupations*, 1950, *28*, 306-310.
53. Cottle, W. C. A factorial study of the Multiphasic, Strong, Kuder, and Bell inventories using a population of adult males. *Psychometrika*, 1950, *15*, 25-47.
54. Cottle, W. C. Card versus booklet forms of the MMPI. *J. appl. Psychol.*, 1950, *34*, 255-259.
55. Cottle. W. C. & Powell, J. O. Relationship of mean scores on the Strong, Kuder, and Bell inventories with the MMPI M-F scale as a criterion. *Trans Kans. Acad. Sci.*, 1949, *52*, 396-398.
56. Cottle, W. C. & Powell, J. O. The effect of random answers to the MMPI. *Educ. & Psychol. Meas.*, 1951, *11*, 224-227.
57. Cronbach, L. J. Response sets and test validity. *Educ. & Psychol. Meas.*, 1946, *6*, 475-494.
58. Crook, G. H. The measurement of personal characteristics: Are available tests of personality of use in the Army? *Personnel Research Section* Report No. 669, 1944.
59. Cross, O. H. Braille edition of the MMPI for use with the blind. *J. appl. Psychol.*, 1947, *31*, 189-198.
60. Daly, J. M. Relationship of the Minnesota Multiphasic Personality Inventory and the Kuder Preference Record. M. A. Thesis, Catholic Univ., 1948.
61. Daniels, E. E., & Hunter, W. A. MMPI personality patterns for various occupations. *J. appl. Psychol.*, 1949, *33*, 559-565.
62. Davis, C. E. The MMPI: A new method of scoring and analysis. *J. clin. Psychol.*, 1947, *3*, 298-301.
63. de Cillis, O. E. & Orbison, W. D. A comparison of the Terman-Miles M-F Test and the Mf scale of the MMPI. *J. appl. Psychol.*, 1950, *34*, 338-342.
64. Drake, L. E. A social I. E. scale for the MMPI. *J. appl. Psychol.*, 1946, *30*, 51-54.
65. Drake, L. E. A method for machine scoring the card form of the MMPI. *J. educ. res.*, 1947, *41*, 139-141.
66. Drake, L. E. & Thiele, W. B. Further validation of the social I. E. scale for the MMPI. *J. educ. res.*, 1948, *41*, 551-556.
67. Du Mas, F. M. A quick method of analyzing the similarity of profiles. *J. clin. Psychol.*, 1946, *2*, 80-83.
68. Du Mas, F. M. On the interpretation of personality profiles. *J. clin. Psychol.*, 1947, *3*, 57-65.
69. Du Mas, F. M. The coefficient of profile similarity. *J. clin. Psychol.*, 1949, *5*, 123-131.
70. Du Mas, F. M. A note on the coefficient of profile similarity. *J. clin. Psychol.*, 1950, *6*, 300-301.
71. Ellis, A. The validity of personality questionnaires. *Psychol. Bull.*, 1946, *43*, 385-440.
72. Ellis, A. Personality questionnaires, *Rev. educ. res.*, 1947, *17*, 53-63.
73. Ellis, A. & Conrad, H. S. The validity of personality questionnaires in military practice. *Psychol. Bull.*, 1948, *45*, 385-426.
73a. Farberow, N. L. Personality patterns of suicidal mental hospital patients. *Genet. Psychol. Monog.* 1950, *42*, 3-80.
74. Fassett, K. K. Interest and personality measures of veteran and non-veteran university freshmen men. *Educ. & Psychol. Meas.*, 1950, *10*, 338-341.
74a. Feather, D. B. The relation of personality maladjustments of 503 University of Michigan students to their occupational interests. *J. soc. Psychol.*, 1950, *32*, 71-78.
75. Feldman, M. J. A prognosis scale for shock therapy. *Am. Psychol.*, 1948, *3*, 348 (Abstract).
76. Ferguson, R. G. A useful adjunct to the Minnesota Personality Inventory scoring and analysis. *J. clin. Psychol.*, 1946, *2*, 248-253.
77. Foster, K. A study of WPA white collar workers with respect to job satisfaction and personality characteristics. M. S. Thesis, Univ. of Minnesota, 1941.
78. Francey, R. A study on the "epileptic personality". *Canad. J. Psychol.*, 1950, *4*, 81-87.
78a. Friedman, S. A. Psychometric effects of frontal and parietal lobe brain damage. Unpublished Ph.D. Dissertation, Univ. of Minnesota, 1950.
79. Fry, F. D. A study of the personality traits of college students, and of state prison inmates as measured by the Minnesota Multiphasic Personality Inventory. *J. Psychol.*, 1949, *28*, 439-449.
80. Gilliland, A. R. A comparison of two personality tests. *Am. Psychol.*, 1949, *4*, 258 (Abstract).
81. Gjerde, C. M. Parent-child resemblances in vocational interests and personality traits. Unpublished Ph. D. Dissertation, Univ. of Minnesota, 1949.

81a. Goffard, S. J. Some diagnostic correlates of sociometric status. Unpublished Ph. D. Dissertation, Univ. of Minnesota, 1949.
82. Gough, H. G. Diagnostic patterns on the MMPI. *J. clin. Psychol.*, 1946, *2*, 23-37.
83. Gough, H. G. Simulated patterns on the MMPI. *J. abnorm. soc. Psychol.*, 1947, *42*, 215-225.
84. Gough, H. G. Personality correlates of socio-economic status. *Am. Psychol.*, 1948, *3*, 360 (Abstract).
85. Gough, H. G. A note on the security-insecurity test. *J. soc. Psychol.*, 1948, *28*, 257-261.
86. Gough, H. G. A new dimension of status: I. Development of a personality scale. *Amer. sociol. Rev.*, 1948, *13*, 401-409.
87. Gough, H. G. A new dimension of status: II. Relationship of the St scale to other variables. *Amer. sociol. Rev.*, 1948, *13*, 534-537.
88. Gough, H. G. A new dimension of status: III. Discrepancies between the St scale and 'objective' status. *Amer. sociol. Rev.*, 1949, *14*, 275-281.
89. Gough, H. G. Factors relating to the academic achievement of high school students. *J. educ. Psychol.*, 1949, *40*, 65-78.
90. Gough, H. G. A research note on the MMPI social I. E. scale. *J. educ. res.*, 1949, *43*, 138-141.
91. Gough, H. G. The F minus K dissimulation index for the Minnesota Multiphasic Personality Inventory. *J. consult. Psychol.*, 1950, *14*, 408-413.
92. Gough, H. G. "The Minnesota Multiphasic Personality Inventory." In Weider, A. *Contributions Toward Medical Psychology*, New York: Ronald Press, 1953, Vol. 2.
93. Gough, H. G. Studies of social intolerance: II. A personality scale for anti-Semitism. *J. soc. Psychol.*, 1951, *33*, 247-255.
94. Gough, H. G., McClosky, H. & Meehl, P. E. A personality scale for dominance. *J. abnorm. soc. Psychol.*, 1951, *46*, 360-366.
95. Gough, H. G., McClosky, H. & Meehl, P. E. A personality scale for social responsibility. *J. abnorm. soc. Psychol.*, 1952, *47*, 73-80.
96. Grant, H. A rapid personality evaluation based on the MMPI and the Cornell Selection Index, *Am. J. Psychiat.*, 1946, *103*, 33-41.
97. Guetzkow, H., et al. Recovery after twelve weeks of controlled nutritional rehabilitation following experimental semi-starvation in man. Part III. Personality. *Am. Psychol.*, 1947, *2*, 330-333 (Abstract).
98. Gulde, C. J. & Roy, H. L. A note on the scoring of the MMPI. *J. consult. Psychol.*, 1947, *11*, 221-222.
99. Guthrie, G. M. Six MMPI diagnostic profile patterns. *J. Psychol.*, 1950, *28*, 317-323.
100. Hales, W. M. & Simon, W. MMPI patterns before and after insulin shock therapy. *Am. J. Psychiat.*, 1948, *105*, 254-258.
101. Hampton, P. J. The MMPI as a psychometric tool for diagnosing personality disorders among college students. *J. soc. Psychol.*, 1947, *26*, 99-108.
102. Harmon, L. R. & Wiener, D. N. Use of the MMPI in vocational adjustment. *J. appl. Psychol.*, 1945, *29*, 132-141.
103. Harris, R. E. Measured personality characteristics of convulsive therapy patients: A study of diagnostic and prognostic criteria. *Psychol. Bull.*, 1945, *42*, 535 (Abstract).
104. Harris, R. E. & Christiansen, C. Prediction of response to brief psychotherapy. *J. Psychol.*, 1946, *21*, 269-284.
105. Harris, R. E. & Ives, V. M. A study of the personality of alcoholics. *Am. Psychol.*, 1947, *2*, 405 (Abstract).
106. Harris, R. E., et al. Studies in electronarcosis therapy: III. Psychological test findings. *J. nerv. ment. dis.*, 1948, *107*, 371-376.
107. Hathaway, S. R. *Supplementary Manual for the MMPI*. Part I. The K scale and its use. Part II. The booklet form of the MMPI. New York: Psychological Corp., 1946.
108. Hathaway, S. R. A coding system for MMPI profiles. *J. consult. Psychol.*, 1947, *11*, 334-337.
109. Hathaway, S. R. & Harmon, L. R. Clinical counseling in emotional and social rehabilitation. *J. clin. Psychol.*, 1946, *2*, 151-157.
110. Hathaway, S. R. & McKinley, J. C. A multiphasic personality schedule (Minnesota): I. Construction of the schedule. *J. Psychol.*, 1940, *10*, 249-254.
111. Hathaway, S. R. & McKinley, J. C. The measurement of symptomatic depression with the Minnesota Multiphasic Personality Schedule. *Psychol. Bull.*, 1940, *37*, 425 (Abstract).
112. Hathaway, S. R. & McKinley, J. C. *The Minnesota Multiphasic Personality Schedule*. Minneapolis: Univ. of Minnesota Press. 1942.

113. Hathaway, S. R. & McKinley, J. C. A multiphasic personality schedule (Minnesota): III. The measurement of symptomatic depression. *J. Psychol.*, 1942, *14*, 73-84.
114. Hathaway, S. R. & McKinley, J. C. *The Minnesota Multiphasic Personality Inventory*. (Rev. ed.) Minneapolis: Univ. of Minnesota Press. 1943.
115. Hathaway, S. R. & McKinley, J. C. *Manual for the MMPI*. New York: Psychological Corp., 1945.
116. Hathaway, S. R. & Meehl, P. E. *Atlas for the Clinical Use of the MMPI*. Minneapolis: University of Minnesota Press, 1951.
117. Hawkes, G. R. Use of the Minnesota Multiphasic Personality Inventory in screening college students for counseling purposes. *J. educ. Psychol.*, 1950, *41*, 116-121.
118. Heston, J. C. A comparison of four masculinity-femininity scales. *Educ. & Psychol. Meas.*, 1948, *8*, 375-388.
119. Holzberg, J. D. & Allessi, S. Reliability of the shortened MMPI. *J. consult. Psychol.*, 1949, *13*, 288-292.
120. Hovey, H. B. Detection of circumvention in the MMPI. *J. clin. Psychol.*, 1948, *4*, 97.
121. Hovey, H. B. Somatization and other neurotic reaction and MMPI profiles. *J. clin. Psychol.*, 1949, *5*, 153-157.
122. Hunt, H. F. The effect of deliberate deception on MMPI performance. *J. consult. Psychol.*, 1948, *12*, 396-402.
123. Hunt, H. F., et al. A study of the differential diagnostic efficiency of the MMPI. *J. consult. Psychol.*, 1948, *12*, 331-336.
124. Hunt, E. L. & Lehner, G. F. J. Relationships of the Hildreth feeling and attitude scales to the MMPI. *J. clin. Psychol.*, 1948, *4*, 412-414.
125. Hunt, W. A. & Stevensons, I. Psychological testing in military clinical psychology: II. Personality testing. *Psych. Rev.*, 1946, *53*, 107-115.
126. Jeffery, M. E. Some factors influencing answers on the Multiphasic K scale. Ph. D. Dissertation, Univ. of Minnesota, 1946.
127. Jensen, M. B. & Rotter, J. B. The value of thirteen psychological tests in officer candidate screening. *J. appl. Psychol.*, 1947, *31*, 312-322.
128. Johnson, R. L. E. The relation of religious attitudes and selected personality characteristics. M. A. Thesis, Univ. of Minnesota, 1948.
129. Johnson, R. H. & Bond, G. L. Reading ease of commonly used tests. *J. appl. Psychol.*, 1950, *34*, 319-324.
130. Kahn, H. & Singer, E. An investigation of some of the factors related to success or failure of School of Commerce students. *J. educ. Psychol.*, 1949, *40*, 107-117.
131. Kalhorn, J. Personality and parent behavior. *Am. Psychol.*, 1947, *2*, 425 (Abstract).
132. Kamman, G. R. Psychosomatic diagnosis. *J. Lancet*, 1947, *67*, 102-107.
133. Kaufmann, P. Changes in the Minnesota Multiphasic Personality Inventory as a function of psychiatric therapy. *J. consult. Psychol.*, 1950, *14*, 458-464.
134. Kazan, A. T. & Sheinberg, I. M. Clinical note on the significance of the validity score (F) in the MMPI. *Am. J. Psychiat.*, 1945, *102*, 181-183.
135. Krise, E. M. A short method of scoring the MMPI. *J. clin. Psychol.*, 1947, *3*, 386-392.
136. Krise, E. M. A common error in scoring the Minnesota Multiphasic Personality Inventory. *J. clin. Psychol.*, 1949, *5*, 180-181.
137. Lewis, J. A. Kuder Preference Record and MMPI scores for two occupational groups. *J. consult. Psychol.*, 1947, *11*, 194-201.
138. Leverenz, C. W. The Minnesota Multiphasic Personality Inventory: An evaluation of its usefulness in the psychiatric service of a station hospital. *War Medicine*, 1943, *4*, 618-629.
139. Lively, M. L. An investigation of some clinical aspects of the Heidbreder introversion-extroversion variable. M. A. Thesis, Univ. of Minnesota, 1943.
140. Loth, N. N. Correlation between the Guilford-Martin inventory of factors STDCR and the Minnesota Multiphasic Personality Inventory at the college level. M. A. Thesis, Univ. of Minnesota, 1945.
141. Lough, O. M. Teachers college students and the MMPI. *J. appl. Psychol.*, 1946, *30*, 241-247.
142. Lough, O. M. Women students in liberal arts, nursing, and teacher training curricula and the MMPI. *J. appl. Psychol.*, 1947, *31*, 437-445.
142a. Lough, O. M. & Green, M. E. Comparison of the MMPI and the Washburne S. A. Inventory as a measure of personality of college women. *J. soc. Psychol.*, 1950, *32*, 23-30.
143. Lough, O. M. Correction for "Women students in liberal arts, nursing, and teacher training curricula and the MMPI". *J. appl. Psychol.*, 1951, *35*, 125-126.
143a. Louttit, C. & Browne, C. G. The use of psychometric instruments in psychological clinics. *J. consult. Psychol.*, 1947, *11*, 49-59.

143b. Mann, W. A. Validation of the Cornell Index for freshmen at Michigan State College, Unpublished Ph. D. Dissertation, Michigan State College, 1949.
144. Manson, M. P. A psychometric analysis of psychopathic characteristics of alcoholics. *J. consult. Psychol.*, 1949, *13*, 111-118.
145. Manson, M. P. & Grayson, H. M. Keysort method of scoring the MMPI. *J. appl. Psychol.*, 1946, *30*, 509-516.
145a. McAllister, C. E. A study of item behavior in the depression scale of the Minnesota Multiphasic Personality Inventory. Unpublished Master's thesis, the Pennsylvania State College, 1950.
146. McKinley, J. C. & Hathaway, S. R. A multiphasic personality schedule (Minnesota): II. A differential study of hypochondriasis. *J. Psychol.*, 1940, *10*, 255-268.
147. McKinley, J. C. & Hathaway, S. R. A multiphasic personality schedule (Minnesota): IV. Psychasthenia. *J. appl. Psychol.*, 1942, 26, 614-624.
148. McKinley, J. C. & Hathaway, S. R. The identification and measurement of the psychoneuroses in medical practice. *J. Amer. Med. Assoc.*, 1943, *122*, 161-167.
149. McKinley, J. C. & Hathaway, S. R. The MMPI: V. Hysteria, Hypomania, and psychopathic deviate. *J. appl. Psychol.*, 1944, *28*, 153-174.
150. McKinley, J. C., Hathaway, S. R., & Meehl, P. E. The MMPI: VI. The K scale. *J. consult. Psychol.*, 1948, *12*, 20-31.
151. Meehl, P. E. The dynamics of 'structured' personality tests. *J. clin. Psychol.*, 1945, *1*, 296-303.
152. Meehl, P. E. An investigation of a general normality or control factor in personality testing. *Psychol. Monogr.*, 1945, *59*, 4-62.
153. Meehl, P. E. Profile analysis of the MMPI in differential diagnosis. *J. appl. Psychol.*, 1946, *30*, 517-524.
154. Meehl, P. E. Configural scoring. *J. consult. Psychol.*, 1950, *14*, 165-171.
155. Meehl, P. E. & Hathaway, S. R. The K factor as a suppressor variable in the MMPI. *J. appl. Psychol.*, 1946, *30*, 525-564.
156. Michael, J. C. & Buhler, C. Experiences with personality testing in a neuropsychiatric department of a public general hospital. *Dis. nerv. system*, 1945, *6*, 205-211.
157. Miller, D. R. Levels of aspiration of hysterics and neurasthenics. *Am. Psychol.*, 1947, *2*, 406 (Abstract).
158. Modlin, H. C. A study of the MMPI in clinical practice: With notes on the Cornell Index. *Am. J. Psychiat.*, 1947, *103*, 758-769.
159. Monachesi, E. D. Some personality characteristics of delinquents and non-delinquents. *J. crim. law crimin.*, 1948, *38*, 487-500.
159a. Monachesi, E. D. Personality characteristics and socio-economic status of delinquents and non-delinquents. *J. crim. law crimin.*, 1950, *40*, 570-583.
160. Morris, W. W. A preliminary evaluation of the MMPI. *J. clin. Psychol.*, 1947, *3*, 370-374.
161. Morton, M. A. The Army adaptation of the MMPI. *Am Psychol.*, 1948, *3*, 271-272 (Abstract).
162. Mullen, F. A. The MMPI: An extension of the Davis scoring method. *J. clin. Psychol.*, 1948, *4*, 86-88.
163. Nance, R. D. Masculinity-femininity in prospective teachers. *J. educ. res.*, 1949, *42*, 658-666.
164. O'Gorman, W. D. & Kunkle, E. C. Study of the relation between Minnesota Multiphasic Personality Inventory scores and 'pilot error' in aircraft accidents. *J. Aviation Med.*, 1947, *18*, 31-38.
165. Owens, W. A. & Johnson, W. C. Some measured personality traits of collegiate underachievers. *J. educ. Psychol.*, 1949, *40*, 41-46.
166. Pacella, B. L. et al. The effects of electric convulsive therapy on certain personality traits in psychiatric patients. *Am. J. Psychiat.*, 1947, *104*, 83-91.
167. Page, R. B. Application of the Minnesota Personality Inventory to tuberculosis patients. Ph. D. Dissertation, Univ. of Minnesota, 1947.
168. Pearson, J. S. Prediction of the response of schizophrenic patients to electro-convulsive therapy. *J. clin. Psychol.*, 1950, *6*, 285-287.
168a. Perlman, M. Social class membership and test-taking attitude. Unpublished M. A. thesis, Univ. of Chicago, 1950.
169. Phillips, E. L. & Wiener, D. N. Relationships between selected disability and disease groups and the MMPI. *Am. Psychol.*, 1947, *2*, 274 (Abstract).
169a. Portenier, L. G. Personality tests in a University guidance program. *J. educ. Psychol.*, 1948, *39*, 479-487.

170. Rashkis, H. A. & Shaskan, D. A. The effects of group psychotherapy on personality inventory scores. *Am. J. Orthopsychiat.*, 1946, *16*, 345-349.
171. Rose, A. A. A study of homesickness in college freshmen, *J. soc. Psychol.*, 1947, *26*, 185-202.
172. Rosen, H. Correlation between the Schellenberg free association test and the Minnesota Multiphasic Personality Inventory. M. A. Thesis, Univ. of Minnesota, 1944.
173. Rosenzwieg, S. The dynamics of an amnesic personality. *J. Personality*, 1946, *15*, 121-142.
174. Rubin, H. The MMPI as a diagnostic aid in a veterans' hospital. *J. consult. Psychol.*, 1948, *12*, 251-254.
175. Rubin, H. A note on "Reply to Rubin". *J. consult. Psychol.*, 1950, *14*, 327-328.
176. Ruesch, J. Psychophysiological relation in cases with head injuries. *Psychosom. Med.*, 1945, *7*, 158-168.
177. Ruesch, J. Personality structure, lactic acid production, and work performance in psychiatric patients. *J. Psychol.*, 1945, *20*, 381-390.
178. Ruesch, J., et al. Psychological invalidism in thyroidectomized patients. *Psychosom. Med.*, 1947, *9*, 77-91.
179. Ruesch, J. & Bowman, K. Prolonged post-traumatic syndromes following head injury. *Am. J. Psychiat.*, 1945, *102*, 145-163.
180. Schiele, B. C., Baker, A. B. & Hathaway, S. R. The Minnesota Multiphasic Personality Inventory. *J. Lancet*, 1943, *63*, 292-297.
181. Schiele, B. C. & Brozek, J. Experimental neurosis resulting from semistarvation in man. *Psychosom. Med.*, 1948, *10*, 31-50.
181a. Schmid, J. Jr. Factor analyses of prospective teacher's differences. *J. exp. Psychol.*, 1950, *18*, 287-319.
182. Schmidt, H. O. Test profiles as a diagnostic aid: The MMPI. *J. appl. Psychol.*, 1945, *29*, 115-131.
183. Schmidt, H. O. Notes on the MMPI: The K-factor. *J. consult. Psychol.*, 1948, *12*, 337-342.
184. Schneck, J. M. Clinical evaluation of the F scale on the MMPI. *Am. J. Psychiat.*, 1948, *104*, 440-442.
185. Schneck, J. M. The double-spike pattern on the MMPI. *Am. J. Psychiat.*, 1948, *104*, 443-445.
186. Schofield, W. MMPI responses with certain therapies. Ph. D. Thesis, Univ. of Minnesota, 1948.
187. Schofield, W. Changes in responses to the Minnesota Multiphasic Inventory following certain therapies. *Psychol. Monog.*, 1950, *64;* 5, pp. 33.
188. Schneidman, E. S. A short method of scoring the MMPI. *J. consult. Psychol.*, 1946, *10*, 143-145.
189. Simon, W. Attempted suicide among veterans. *J. nerv. ment. dis.*, 1950, *111*, 451-468.
190. Simon, W. & Hales, W. M. Note on a suicide key in the Minnesota Multiphasic Personality Inventory. *Am. J. Psychiat.*, 1949, *106*, 222-223.
191. Sisk, H. L. A reply to Winfield's study of the Multiple Choice Rorschach. *J. appl. Psychol.*, 1947, *31*, 446-448.
192. Spiaggia, M. An investigation of the personality traits of art students. *Educ. & Psychol. Meas.*, 1950, *10*, 285-293.
193. Staff, Personnel Research Section, Personnel Research and Procurement Branch, Adjutant General's Office. Research on personality testing. *Bulletin of Military Clinical Psychologists*, 1946, *1*, 33-41.
193a. Staudt, V. M. The relationship of certain personality traits to errors and correct responses in several types of tasks among college women under varying test conditions. *J. Psychol.*, 1949, *27*, 465-478.
194. Stout, M. An analysis of the structure of the MMPI. M. S. thesis, The Pennsylvania State College, 1949.
195. Super, D. E. *Appraising Vocational Fitness.* New York: Harper & Bros., 1949, pp. 499-510.
196. Sweetland, A. Hypnotic neurosis: Hypochondriasis and depression. *J. gen. Psychol.*, 1948, *39*, 91-105.
197. Thompson, G. MMPI correlates of certain movement responses in the group Rorschachs of two college samples. *J. consult. Psychol.*, 1948, *12*, 379-383.
198. Traxler, A. E. & Jacobs, R. Construction and educational significance of structured inventories in personality measurement. *Rev. educ. res.*, 1950, *20*, 38-50.
199. Van Vorst, R. B. An evaluation of test performances of a group of psychopathic delinquents. *Psychol. Bull.*, 1943, *40*, 583 (Abstract).
200. Verniaud, W. M. Occupational differences in the MMPI. *J. appl. Psychol.*, 1946, *30*, 604-613.

200a. Vig, M. J. A clinical investigation into the psychological aspects of multiple sclerosis. Unpublished Ph. D. Dissertation, Univ. of Minnesota, 1947.
201. Walch, A. E. & Schneider, R. A. The Minnesota Multiphasic Personality Inventory: An evaluation of its use in private practice. *Minnesota Medicine,* 1947, *30,* 753-758.
201a. Waters, R. O. V. & Semrad, E. V. Use of the MMPI is assessing the Pd factor in psychopathic personalities. *Dis nerv. syst.,* 1949, *10,* 267-272.
202. Wauck, L. A. Schizophrenia and the MMPI. *J. clin. Psychol.,* 1950, *6,* 279-282.
203. Welsh, G. S. An extension of Hathaway's MMPI profile coding system. *J. consult. Psychol.,* 1948, *12,* 343-344.
204. Welsh, G. S. Some practical uses of MMPI coding. *J. consult. Psychol.,* 1951, *15,* 82-84.
205. Welsh, G. S. An anxiety index and an internalization ratio for the MMPI. *J. consult. Psychol.,* 1952, *16,* 65-72.
206. Wesley, E. Correlations between the Guilford- Martin personality factors O, Ag, Co, and the Minnesota Multiphasic Personality Inventory at the college level. M. A. Thesis, Univ. of Minnesota, 1945.
207. Wesley, S. M., Corey, D. Q. & Stewart, B. M. The intra-individual relationship between interest and ability. *J. appl. Psychol.,* 1950, *34,* 193-197.
208. Wiener, D. N. Differences between the individual and group forms of the MMPI. *J. consult. Psychol.,* 1947, *11,* 104-106.
209. Wiener, D. N. Personality characteristics of selected disability groups. *J. clin. Psychol.,* 1948, *4,* 285-290.
210. Wiener, D. N. Subtle and obvious keys for the MMPI. *J. consult. Psychol.,* 1948, *12,* 164-170.
211. Weiner, D. N. & Simon, W. Personality characteristics of embalmer trainees. *J. appl. Psychol.,* 1950, *34,* 391-393.
212. Wiener, D. N. & Phillips, E. L. A study of progress in psychotherapy. *J. clin. Psychol.,* 1948, *4,* 201-206.
213. Winberg, W. C. Some personality traits of collegiate underachievers. *Proc. Iowa Acad. Sci.,* 1947, *54,* 267-270.
214. Winfield, M. C. The use of the Harrower-Erickson multiple choice Rorschach test with a selected group of women in military service. *J. appl. Psychol.,* 1946, *30,* 481-487.
215. Zwerling, I. Psychological factors in susceptibility to motion sickness. *J. Psychol.,* 1947, *23,* 219-239.

1951 Bibliography

(Except for this listing, these references are not reported in the paper.)

Asch, M. J. Nondirective teaching in psychology: An experimental study. *Psychol. Monog.,* No. 321, 1951.

Benarik, S. J., et. al. An interpretive aid for the Sc scale of the MMPI. *J. consult. Psychol.,* 1951, *15,* 142-144.

Cantor, A. H. MMPI profiles in multiple sclerosis. *J. consult. Psychol.,* 1951, *15,* 253-256.

Carpenter, L. G., et al. A scale for the measurement of personality in patients with essential hypertension. Paper delivered before Western Psychological Association, 1951, San Jose, California.

Cauffiel, P. W. & Snyder, W. U. A comparison of the performance of a randomly selected college population on the MMPI and the P-S Experience Blank. *J. clin. Psychol.,* 1951, *7,* 267-270.

Clark, G. C. & Allen, R. W. Item analysis aid for the MMPI. *J. consult. Psychol.,* 1951, *15,* 262.

Feldman, M. J. A prognostic scale for shock therapy. *Psychol. Monog.,* 1951, *65,* No. 10.

Gayral, L., et. al. Étude critique de l'inventaire multiphasique de personnalité: "Test" de Minnesota. *Ann med. Psychol.,* 1951, *2,* 166-178.

Gilliland, A. R. The Humm-Wadsworth and the Minnesota Multiphasic. *J. consult. Psychol.,* 1951, *15,* 457-459.

Gilliland, A. R. & Colgin, R. Norms, reliability, and forms of the MMPI. *J. consult. Psychol.,* 1951, *15,* 435-438.

Glaser, R. Predicting achievement in medical school. *J. appl. Psychol.,* 1951, *35,* 272-274.

Gough, H. G. Studies of social intolerance: III. Relationship of the *Pr* scale to other variables. *J. soc. Psychol.,* 1951, *33,* 257-262.

Gough, H. G. Studies of social intolerance: IV. Related social attitudes. *J. soc. Psychol.,* 1951, *33,* 263-269.

Hampton, P. J. A psychometric study of drinkers. *J. consult. Psychol.,* 1951, 15, 501-504.

Hanvik, L. J. MMPI profiles in patients with low-back pain. *J. consult. Psychol.*, 1951, *15*, 350-353.

Hathaway, S. R. & McKinley, J. C. Minnesota Multiphasic Personality Inventory: Manual. (Revised) New York: Psychological Corporation, 1951.

Hathaway, S. R. & Monachesi, E. D. The prediction of juvenile delinquency using the Minnesota Multiphasic Personality Inventory. *Amer. J. Psychiat.*, 1951, *108*, 469-473.

McAllister, C. E. A study of item behavior in the depression scale of the Minnesota Multiphasic Personality Inventory. Unpublished Master's thesis, The Pennsylvania State College, 1951.

McClelland, W. A. A preliminary test of role-playing ability. *J. consult. Psychol.*, 1951, *15*, 89-94.

Michaelis, J. U. & Tyler, F. T. MMPI and student teaching. *J. appl. Psychol.*, 1951, *35*, 122-124.

Miller, D. R. Responses of psychiatric patients to threat of failure. *J. abnorm. soc. Psychol.*, 1951, *46*, 378-387.

Pearson, J. S. & Swenson, W. M. A note on extended findings with the MMPI in predicting response to electro-convulsive therapy. *J. clin. Psychol.*, 1951, 7, 288.

Potter, C. S. A method for using the Minnesota Multiphasic Personality Inventory with the blind. In Donahue, W. & Dabelstein, D. *Psychological Diagnosis and Counseling of the Adult Blind*. New York: American Foundation for the Blind, 1950.

Redlo, M. MMPI personality patterns for several academic major groups. Unpublished Master's Thesis, University of New Mexico, 1951.

Rosen, E. Differences between volunteers and non-volunteers for psychological studies. *J. appl. Psychol.*, 1951, *35*, 185-193.

Ruja, D. H. Personality changes following prefrontal lobotomy in twenty-five schizophrenic patients. Paper delivered before Western Psychological Association, 1951, San Jose, California.

Schmidt, H. O. Comparison of women students in occupational therapy and nursing. *J. Psychol.*, 1951, *31*, 161-174.

Schneidman, E. S., et al. An empirical categorization of psychological test report items. Paper delivered before Western Psychological Association, 1951, San Jose, California.

Shepler, B. F. A comparison of masculinity-femininity measures. *J. consult. Psychol.*, 1951, 15, 484-486.

Smykal, A. & Thorne, F. C. Etiological studies of psychasthenic personality: II Asocial type. *J. clin. Psychol.*, 1951, *7*, 299-316.

Tafejian, T. T. The E-F scale, the MMPI and Gough's Pr scale. Paper delivered before Western Psychological Association, 1951, San Jose, California.

Tyler, F. T. A factorial analysis of fifteen MMPI scales. *J. consult. Psychol.*, 1951, *15*, 451-456.

Weisgerber, C. A. The predictive value of the Minnesota Multiphasic Personality Inventory with student nurses. *J. soc. Psychol.*, 1951, *33*, 3-11.

Welsh, G. S. & Sullivan, P. L. Booklet-card, card-booklet conversion tables for MMPI. 72 La Cuesta, Orinda, California.

Wheeler, W. M., et. al. The internal structure of the MMPI. *J. consult. Psychol.*, 1951, *15*, 134-141.

Winne, J. F. A scale of neuroticism: An adaptation of the MMPI. *J. clin. Psychol.*, 1951, *7*, 117-122.